DETAILED PROJECT REPORT

VOLUME IV A
GEOTECHNICAL INVESTIGATION REPORT

SEMI HIGH SPEED RAIL CORRIDOR
THIRUVANANTHAPURAM TO KASARAGOD

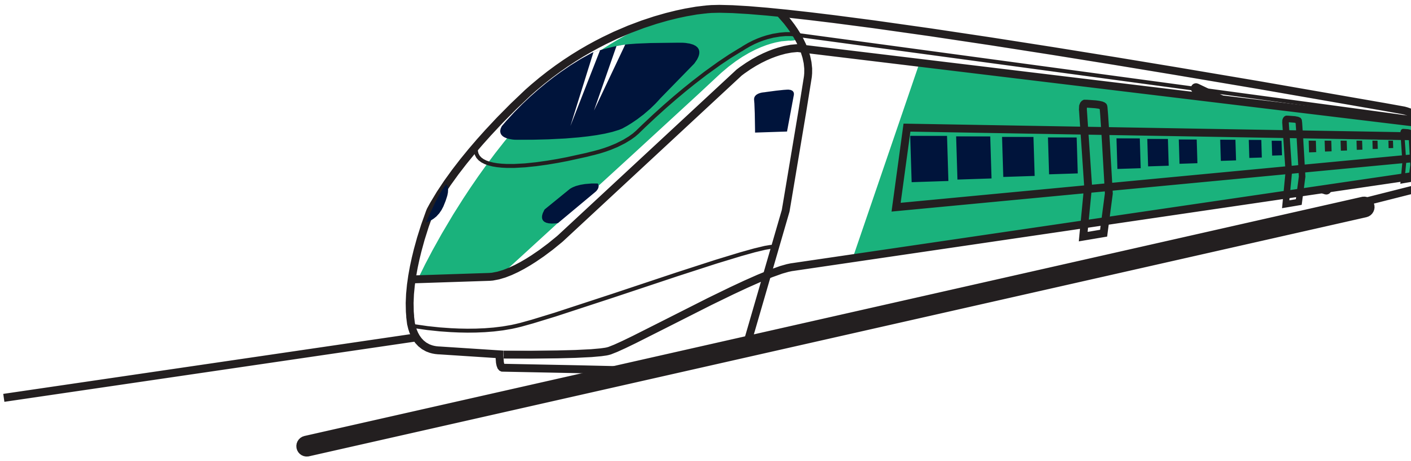
KERALA RAIL DEVELOPMENT CORPORATION LTD

DETAILED PROJECT REPORT

VOLUME IV A
GEOTECHNICAL INVESTIGATION REPORT

SEMI HIGH SPEED RAIL CORRIDOR
THIRUVANANTHAPURAM TO KASARAGOD

……



K-rail

SYSTRA

CONTENTS

PAGE

1. INTRODUCTION ...

2. GEOLOGICAL INFORMATION ...

3. SCOPE OF INVESTIGATION ...

4. FIELD WORK ...
5. FIELD INVESTIGATION ...
6. LABORATORY TEST ...
7. CAPACITY CALCULATION ...
8. DISCUSSION OF FOUNDATION ...
9. RECOMMENDATION ...

APPENDIX

Figure 1: BOREHOLE LOCATION PLAN ...
Figure 2: DISTRIBUTION OF FIELD N-VALUE ...

BORE LOGS ...

LABORATORY TEST RESULTS ...

GRAIN SIZE DISTRIBUTION CURVES ...

ELOGP CURVES ...

MOHR'S CIRCLE PLOTS ...

DIRECT SHEAR ...

APPENDIX

1.0 INTRODUCTION

Geotechnical exploration, investigation and testing of soil samples for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor was entrusted to M/S Anand Raj Infratech Pvt. Ltd, Peer Bharauna, Faridpur More, Fatuha, Patna.

The objective was to ascertain the subsoil characteristics and stratification and propose suitable load carrying capacity of the soil and facilitate design of the foundation for the proposed structure.

2.0 GEOLOGICAL INFORMATION

Geologically Kerala is occupied by Pre Cambrian crystalline, acid to ultra-basic intrusives of 21 Archaean to Proterozoic age, Tertiary (Mio Pliocene) sedimentary rocks and Quaternary sediments of fluvial and marine origin (GSI, 2005). Seismic Zone – III (BIS).

The Quaternary sediments of Kerala comprise alluvium, beach sand deposits; limeshell deposits, red sands, peat beds, calcareous clays with shells which are underlain by laterite in the coastal area, which also marks the unconformity with Mio-Pliocene sediments (Rajendran, 1987). These sediments are distributed extensively in the low lying areas in Quilon, Kottayam, Alleppey, Ernakulam, Trichur Calicut, Cannanore and Kasaragod districts. Occasionally, towards the inland areas, these units arc separated from the Tertiary sediments by a polymict pebble bed. These are recorded at Kundara and Attingal in the south and Nileshwar and Kasaragod in the north. These sediments have been categorised tentatively as Recent to Sub-Recent sequences by Paulose and Narayanaswamy (1968).

Major units of the archaean continental crust, such as granulites, granites, gneisses and green stones are preserved. Southern part of the State, south of achankovil shear zone, exposes an assemblage of migmatised meta sedimentary and meta igneous rocks (khondalite-charnockite assemblage From north of the achankovil shear zone up to the southern flank of the palaghat gap, the rocks are predominantly charnockites, charnockitic gneisses and a variety of other gneisses with occasional assemblages of metasediments in the idukki-munnar region representing the western continuation of the Madurai block in Tamil Nadu. Within the southern part of the palaghat gap, charnockite patches and hornblende biotite-gneisses are predominate. Towards the central and northern part of the gap migmatitic gneisses (hornblende biotite gneisses) and occasional patches of amphibolites, calc-granulite and granites are observed. Northern flank of the gap consists of a meta sedimentary sequence of khondalite and calc-granulite with crystalline lime stone bands. Granulites, schists, and gneisses, intruded by acid and alkaline plutons constitute the northern most part of the State (Soman 2002). Khondalites are essentially garnet silliminite gneisses containing varying amount of graphite. These groups of rocks are in abundance in areas south of Achankoil shear zone in the thiruvananthapuram and kollam districts. The data base indicates that the piping incidents rare in areas south of Achankovil where Khodalites are in abundance. Where as in areas dominated by sargur group in wayanad and Southern Karnataka soil piping incidences are prominent. The incidences are reported from areas where there are thick formations of iaterites over the base crystalline rocks. Such incidences are reported from Idukki, Kozhikode districts.

3.0 SCOPE OF INVESTIGATION

The activities to be performed under this tender are detailed below. A reference index plan is enclosed herewith for indication of the route to be followed for the geotechnical investigation.

The scope of work inter-alia will include following:

3.1 Conducting subsoil exploration by drilling bore holes of NX size 75mm (3'') or higher diameter in all kinds of soil and rocky strata including gravels, cobbles and boulders in open ground, along the roads/ structures and in water bodies, river or marine. All the boreholes are required to be drilled upto a depth up to 60m or more depending upon the soil / rock strata found below the ground level. These bore holes shall be drilled at feasible locations along the road ROWs or any other accessible locations without causing inconvenience to the local public or as directed by the Engineer. In case the hard rock is found the drilling will continue at least five meter in the hard rock.

3.2 After successful completion of the bore hole, all the drilled bore holes need to be filled back with Sand.

3.3 Work site needs to be barricaded at all times to ensure safety during work.

3.4 Conducting Standard Penetration Test (SPT) at every 3.00m interval, starting from first sample at 1.50m depth or at the change in stratum, except rock including recording of "N" value as required up to any depth as per IS: 2131.

3.5 Collection of Undisturbed soil samples at 3.00m interval or change of Strata, alternatively with conducting of SPT, disturbed soil samples as per IS: 2132. Collection of rock core samples in wooden/Steel core boxes as per direction of Engineer.

3.6 Preparation and Submission of field borehole logs and reports. The scope will include preparation of all kinds of sections/ maps like lithological sections, etc. as per direction from Engineer.

3.7 Safe transportation of Soil and selected rock core samples to the laboratory.

3.8 Field and lab investigations and reporting.

3.9 Recording of water table level in the bore holes after completion of boring.

3.10 Conducting in-situ permeability tests in Rocky strata and all other types of soils.

3.11 In case of drilling in rock double tube/ triple tube core barrel shall be used to get the core recovery (CR) and Rock Quality Designation (RQD) and record the RQD/CR values.

3.12 Shear test shall be tri-axial for soft soils & mixed soils. Direct shear shall be resorted to sand samples

3.13 Conduct all necessary laboratory tests on samples collected as per Schedule and Technical Specifications.

3.14 Marking the bore hole location on ground as per survey plan and plotting the same in alignment plan.

3.15 Preparation of bore logs and location plan of boreholes on computer by using suitable Software

3.16 Plotting the soil strata profile.

3.17 Preparation of report summarizing the details of soil/rock classifications, analysis of test data and recommending the type of foundations to be adopted with design calculations for the proposed corridor, duly highlighting the design criteria and design methodology and different groups of soil strata encountered.

3.18 Submission of draft report including geological logs, lab test results & foundation analysis in desired copies.

4.0 Field work is summarized in the following table.

Bore Hole No.	**Termination Depth** *(m)*	**Water Level** *(m)*	**Reduced Level**	**Start Date**	**End Date**
BH-GT-01	24.00	3.72	3.30	28.08.19	02.09.19
BH-GT-02	21.50	4.11	7.50	11.10.19	12.10.19
BH-GT-04	20.00	4.45	6.10	09.09.19	10.09.19
BH-GT-05	22.50	3.40	15.20	19.09.19	29.09.19
BH-GT-06	23.50	2.17	3.20	12.09.19	15.09.19
BH-GT-07	19.50	1.48	5.90	16.09.19	19.09.19
BH-GT-08	12.50	1.00	13.00	26.02.19	28.02.19
BH-GT-09	20.50	2.75	82.60	29.09.19	01.10.19
BH-GT-10	21.00	7.45	21.40	17.09.19	23.09.19

Bore Hole No.	**Termination Depth** *(m)*	**Water Level** *(m)*	**Reduced Level**	**Start Date**	**End Date**
BH-GT-11	38.30	5.00	44.40	01.10.19	03.10.19
BH-GT-12	40.50	17.00	7.10	28.09.19	01.10.19
BH-GT-13	28.70	3.60	3.30	25.09.19	30.09.19
BH-GT-14	27.00	0.00	12.00	02.10.19	04.10.19
BH-GT-15	27.50	1.50	4.50	01.10.19	03.10.19
BH-GT-16	41.00	1.50	20.20	01.10.19	03.10.19
BH-GT-17	43.50	1.20	11.10	19.09.19	21.09.19
BH-GT-18	38.50	3.60	53.80	18.09.19	20.09.19
BH-GT-19	17.10	1.00	21.00	17.09.19	17.09.19
BH-GT-20	36.75	3.30	39.60	06.10.19	09.10.19

Bore Hole No.	**Termination Depth** *(m)*	**Water Level** *(m)*	**Reduced Level**	**Start Date**	**End Date**
BH-GT-21	17.40	0.40	3.60	03.09.19	04.09.19
BH-GT-22	40.50	8.10	39.00	05.09.19	06.09.19
BH-GT-23	27.00	4.50	15.90	03.09.19	06.09.19
BH-GT-24	27.50	5.30	3.70	04.09.19	07.09.19
BH-GT-25	33.50	7.00	29.40	07.10.19	08.10.19
BH-GT-26	18.50	0.30	5.10	08.10.19	09.10.19
BH-GT-27	23.50	3.70	5.30	07.10.19	08.10.19
BH-GT-28	15.00	1.50	7.90	03.10.19	10.10.19
BH-GT-29	27.50	9.70	2.90	04.10.19	05.10.19
BH-GT-30	19.00	5.00	7.50	30.09.19	01.10.19

Bore Hole No.	**Termination Depth** *(m)*	**Water Level** *(m)*	**Reduced Level**	**Start Date**	**End Date**
BH-GT-31	24.50	4.70	3.20	15.10.19	17.10.19
BH-GT-32	13.00	3.90	16.30	02.10.19	04.10.19
BH-GT-33	19.00	3.60	26.70	04.10.19	06.10.19
BH-GT-34	21.50	5.60	5.60	03.10.19	05.10.19
BH-GT-35	18.50	4.40	3.00	06.10.19	06.10.19
BH-GT-36	5.00	4.75	9.20	03.10.19	04.10.19
BH-GT-36B	12.50	3.50	33.10	28.10.19	30.10.19
BH-GT-37	25.00	4.80	21.60	04.10.19	04.10.19
BH-GT-38	27.00	3.30	7.60	08.10.19	11.10.19
BH-GT-39	13.00	5.35	4.70	19.10.19	21.10.19

Bore Hole No.	Termination Depth *(m)*	Water Level *(m)*	Reduced Level	Start Date	End Date
BH-GT-40	8.00	3.10	23.80	19.10.19	20.10.19
BH-GT-41	19.50	2.62	23.60	08.10.19	09.10.19
BH-GT-42	14.00	5.10	27.10	22.10.19	22.10.19
BH-GT-43	9.50	2.70	24.00	18.10.19	20.10.19
BH-GT-44	22.00	4.90	5.00	05.11.19	07.11.19
BH-GT-44A	18.54	2.80	9.40	26.10.19	05.11.19
BH-GT-44B	24.00	3.10	57.10	19.02.20	24.02.20
BH-GT-45	8.50	2.00	9.60	23.10.19	25.10.19
BH-GT-46	8.50	2.65	18.70	13.10.19	17.10.19
BH-GT-47	21.50	5.25	2.80	13.10.19	13.10.19

Bore Hole No.	**Termination Depth** *(m)*	**Water Level** *(m)*	**Reduced Level**	**Start Date**	**End Date**
BH-GT-48	18.50	1.05	8.00	19.10.19	21.10.19
BH-GT-49	17.70	0.25	6.50	14.10.19	16.10.19
BH-GT-50	23.10	0.70	3.70	17.11.19	19.11.19
BH-GT-51	24.00	1.95	3.10	20.11.19	23.11.19
BH-GT-52	13.80	1.30	6.00	19.11.19	20.11.19
BH-GT-53	17.50	5.72	26.20	14.11.19	16.11.19
BH-GT-54	28.62	0.55	15.70	10.11.19	11.11.19
BH-GT-55	15.50	2.00	2.90	17.11.19	18.11.19
BH-GT-56	21.00	1.00	4.30	13.11.19	16.11.19
BH-GT-57	13.13	0.70	3.70	14.11.19	15.11.19

Bore Hole No.	**Termination Depth** *(m)*	**Water Level** *(m)*	**Reduced Level**	**Start Date**	**End Date**
BH-GT-58	20.00	3.00	3.80	11.11.19	12.11.19
BH-GT-59	8.00	1.00	25.60	09.11.19	10.10.19
BH-GT-60	21.50	8.30	15.20	10.11.19	10.10.19
BH-GT-61	18.00	1.50	6.70	10.11.19	12.10.19
BH-GT-62	17.15	5.30	4.20	11.11.19	16.10.19
BH-GT-63	17.60	0.50	6.20	12.10.19	14.10.19
BH-GT-64	12.00	0.50	3.30	15.10.19	16.10.19
BH-GT-65	14.90	2.10	3.70	16.10.19	18.10.19
BH-GT-66	17.00	Nil	12.10	22.10.19	23.10.19
BH-GT-67	14.90	6.80	10.60	17.10.19	18.10.19

Bore Hole No.	**Termination Depth** *(m)*	**Water Level** *(m)*	**Reduced Level**	**Start Date**	**End Date**
BH-GT-68	9.50	Nil	15.00	20.10.19	21.10.19
BH-GT-69	15.20	1.80	15.00	24.10.19	25.10.19
BH-GT-70	14.00	0.25	5.20	22.10.19	25.10.19
BH-GT-71	17.20	0.50	14.40	24.10.19	24.10.19
BH-GT-72	23.00	1.00	6.90	26.10.19	01.11.19
BH-GT-73	13.10	6.20	2.50	27.10.19	28.10.19
BH-GT-74	13.80	7.20	24.90	29.10.19	02.11.19
BH-GT-75	30.40	1.65	3.00	02.11.19	06.11.19
BH-GT-76	20.00	0.50	5.70	01.11.19	05.11.19
BH-GT-77	16.75	0.30	11.60	06.11.19	10.11.19

Bore Hole No.	**Termination Depth** *(m)*	**Water Level** *(m)*	**Reduced Level**	**Start Date**	**End Date**
BH-GT-78	42.70	2.20	6.10	06.11.19	08.11.19
BH-GT-79	47.50	2.20	2.70	12.11.19	17.11.19
BH-GT-80	46.90	7.30	3.20	12.11.19	14.11.19
BH-GT-81	39.29	2.50	71.00	12.11.19	15.11.19
BH-GT-82	25.60	1.60	12.70	15.11.19	17.11.19
BH-GT-83	22.50	0.80	11.20	16.11.19	18.11.19
BH-GT-84	23.50	1.00	2.80	16.11.19	18.11.19
BH-GT-85	34.80	1.60	3.20	19.11.19	21.11.19
BH-GT-86	27.60	0.50	2.90	21.11.19	23.11.19
BH-GT-86A	19.50	1.00	3.40	14.02.20	16.02.20

Bore Hole No.	**Termination Depth** *(m)*	**Water Level** *(m)*	**Reduced Level**	**Start Date**	**End Date**
BH-GT-87	43.00	1.00	2.80	27.11.19	02.12.19
BH-GT-87A	27.50	2.95	3.40	14.02.20	17.02.20
BH-GT-88	32.00	1.00	68.60	29.11.19	01.12.19
BH-GT-89	16.50	4.00	12.80	26.11.19	27.11.19
BH-GT-90	16.00	1.50	6.70	25.11.19	26.11.19
BH-GT-91	21.00	1.50	16.10	01.12.19	02.12.19
BH-GT-92	42.50	0.60	6.70	04.12.19	07.12.19
BH-GT-93	28.50	1.00	2.90	02.12.19	06.12.19
BH-GT-94	32.00	1.20	16.90	03.12.19	07.12.19
BH-GT-95	25.50	1.50	2.80	07.12.19	09.12.19

Bore Hole No.	**Termination Depth** *(m)*	**Water Level** *(m)*	**Reduced Level**	**Start Date**	**End Date**
BH-GT-96	19.50	1.00	11.00	08.12.19	02.12.19
BH-GT-97	27.00	0.50	14.40	13.12.19	18.12.19
BH-GT-98	21.75	2.30	12.60	21.11.19	22.11.19
BH-GT-99	20.45	1.90	11.40	09.12.19	11.12.19
BH-GT-100	15.50	2.30	7.80	11.12.19	13.12.19
BH-GT-101	22.00	0.80	9.10	15.12.19	21.12.19
BH-GT-102	24.00	1.20	5.90	13.12.19	16.12.19
BH-GT-103	23.00	0.50	3.20	18.12.19	23.12.19
BH-GT-104	27.50	8.10	3.00	18.12.19	22.12.19
BH-GT-105	20.50	1.00	9.40	23.12.19	27.12.19

Bore Hole No.	**Termination Depth** *(m)*	**Water Level** *(m)*	**Reduced Level**	**Start Date**	**End Date**
BH-GT-106	35.00	1.92	6.00	23.12.19	28.12.19
BH-GT-107	25.00	1.00	3.00	28.12.19	03.01.20
BH-GT-108	23.00	1.20	23.00	24.12.19	30.12.19
BH-GT-109	26.00	0.80	6.10	03.01.20	07.01.20
BH-GT-110	27.00	0.50	6.50	10.01.20	17.01.20
BH-GT-111	40.50	1.75	5.10	29.12.19	02.01.20
BH-GT-112	44.00	2.70	2.60	05.01.20	11.01.20
BH-GT-113	36.00	0.30	3.50	13.01.20	16.01.20
BH-GT-114	43.00	0.50	15.50	18.01.20	22.01.20
BH-GT-115	26.00	1.00	3.40	19.01.20	23.01.20

Bore Hole No.	**Termination Depth** *(m)*	**Water Level** *(m)*	**Reduced Level**	**Start Date**	**End Date**
BH-GT-116	20.00	1.00	7.40	25.01.20	28.01.20
BH-GT-117	15.00	1.00	6.00	25.01.20	27.01.20
BH-GT-118	18.00	1.00	3.70	24.01.20	26.01.20
BH-GT-119	24.00	1.00	18.50	30.01.20	02.02.20
BH-GT-120	15.50	0.50	10.30	27.01.20	29.01.20
BH-GT-121	23.00	2.30	6.60	30.01.20	02.02.20
BH-GT-122	30.00	1.00	2.80	31.01.20	10.02.20
BH-GT-123	21.00	2.00	2.80	06.02.20	10.02.20

5.0 FIELD INVESTIGATION

5.1 Locations of boreholes were selected in consultation with client Drilling rig was installed at each specified borehole location. Rig was stabilized by making level ground. Initially casing of adequate diameter to suit boring of 100mm hole was lowered and boring was commenced standard rotary type drilling rig was used. Drilling rig deployed is suitable for and has arrangement for driving as well as extracting casing, boring drilling by mud circulation method, conducting Standard Penetration Test (SPT) collection of Undisturbed Soil Sample (UDS) and Disturbed or wash Soil Sample (DS), Core Recovery (CR).

5.2 These were taken by methods, which modify or destroy the natural structure of the materials. These samples were collected frequently from auger, spilt spoon sampler of standard penetrometer to maintain as continuous records of strata encountered. All the samples were labeled and placed in airtight transparent polythene bags and shifted to the laboratory for identification and testing purposes

5.3 Nominal 100mm diameter undisturbed soil samples were recovered. The sampling equipment used consists of a two-tier assembly of sample tubes 450 mm in length fitted at its lower end. The sampling assembly was driven by means of a jarring link to its full length or as far down as was found practicable. After withdrawal the ends of the tubes were sealed with wax at both ends and capped before transmission to the laboratory.

5.4 Standard Penetration Tests (SPT) were conducted in boreholes to obtain SPT ‘N’ values i.e. no. of blows of 63.5kg hammer falling through 75cm, required to penetrate 30 cm of SPT split spoon. This test was conducted as per IS-2131. SPT ‘N’ values are correlated with the relative density of non-cohesive soils and consistency of saturated cohesive soils. This test also collected samples in the split spoon assembly, which are treated as disturbed samples. SPT were taken @ 1.00 m to 1.50 m interval. SPT ‘N’ values are co-related with relative density of non-cohesive stratum and with consistency of cohesive stratum. Co-relations are tabulated below.

5.5 When rock was encountered, size of borehole was changed to Nx (76 mm) diameter. The core recovery is the length of rock core recovered from a core run, and the recovery ratio is the ratio of the length of core recovered to the total length of the core drilled on a given run, expressed as percentage. Core length is measured along the core center line. When the recovery is less than the length of the core run, the non- recovered section should be assumed to be at the end of the run unless there is reason to suspect otherwise. Non-recovery should be marked as NCR / Nil on the boring log.

5.6 The Rock Quality Designation (RQD) is a modified measure of recovery, calculated in order to estimate the quality of the intact rock mass. When calculating RQD, it is important to try to distinguish between naturally occurring discontinuities and mechanical breaks which occur during coring procedure. Only naturally occurring discontinuities will be considered when calculating RQD. When there is uncertainty about a break, it should be considered as natural in order to be conservative in the calculation of RQD. The RQD is a modified core recovery percentage in which the lengths of all pieces of sound core recover 100mm long are summed and divided by the length of the core run, then multiplying by 100. The pieces of core are measured along the centerline along the fully circular barrel section. Depending upon the RQD value rock is categorized in different classes which are described in this report.

5.7 During field investigation work ground water table encountered about near to ground surface. The existing GWT wherever it is, may likely to change with the seasonal variation .In case of minor change in ground water table due to seasonal variation the foundation would not be affected much otherwise it may affect the foundation. However, for design purpose it is advisable to consider the worst possible condition of standing water level to merge with existing ground level, which has been done is present case. The results of bearing capacity of shallow or deep foundation will not be affected by the fluctuation of water table, since the same was estimated under worst condition.

.

6.0 LABORATORY TESTS

Lab tests are conducted (as per relevant IS code) on soil and rock samples to determine their properties, which may be used for design and geotechnical evaluation.

No	Test Description	Relevant IS code
A	**Soil Test**	
1	Natural Moisture Contents (N.M.C.)	IS:2720 (Part 2)
2	Bulk & Dry Unit Weight	IS:2720 (Part 2)
3	Mechanical Analysis (Hydrometer & Sieve)	IS:2720 (Part 4)
4	Atterberg Limits	IS:2720 (Part 5)
5	Tri-axial Tests (UU & CU)	IS:2720 (Part 11& 12)
6	Unconfined Compression Test (UC)	IS:2720 (Part 10)
7	Permeability test	IS: 2720 (Part 17)
8	Specific Gravity	IS:2720 (Part 3)
9	Direct shear test	IS: 2720 (Part 13)
10	Consolidation test	IS: 2720 (Part 15)
B	**Rock Tests**	
1	Water absorption	IS:2386 (Part 3)
2	Specific Gravity	IS:2386 (Part 3)
3	Unit Weight	IS:1303 (Part 1)
4	Crushing strength (UCS)	IS:9143 (Part 1)
5	Point load test	IS:8764 (Part 1)
C	**Chemical Tests**	
1	pH Value	IS:2720 (Part 26)
2	Chloride	IS:6925 (Part 1)
3	Sulphate	IS:3025 (Part 24)

7.0 CAPACITY CALCULATION

The capacity calculation of pile are given below: GT-07

THE SAFE VERTICAL CAPACITY OF PILE IN ROCK IS DETERMINED FOLLOWING THE GUIDELINES OF IRC: 78-2014

From subsoil profile, Modarately to slightely greyish weathered fine to medium grained very hard gneiss is available from 14.50m below EGL.

Assume dia of pile = 1000 mm.

Length of Socket = 1.0D = 1.00 x 1.00 = 1.00 m.

Dia of Socket= 1.00m

Effective length of socket = 1.00-0.3 = 0.70 m.

CR=90%

RQD=84%

Average (CR+RQD)/2>30% along the shaft inside rock, Method-1 is applied for calculation of pile capacity.

Ultimate pile capacity, Q_u, = $R_e+R_{af} = K_{sp} \times q_c \times dr \times A_b + A_s \times C_{us}$

Ksp =Empirical Co-efficient = 1.03

q_c = Ave. Compressive strength of rock core= 201.00 Kg/ cm^2

dr = Depth Factor= 1.20

Ab = Cross-sectional area of pile at base = 7850.00cm^2

As = Surface area of socket = 21994.00cm^2

C_{us} = Ultimate shear strength of rock along the socket length = $0.225\sqrt{q_c}$ = 3.19 Kg/ cm^2

Qa = Ultimate load carrying capacity of pile

= Re + Raf

= $K_{sp} \times q_c \times df \times A_b + A_s \times C_{us}$

= 1.03 x 201 x 1.20 x 7850.00 + 21994.0 x 3.19

= 2020383 kg

Considering factor of safety as per Clause 709.3.2 of IRC: 78-2014

Safe load carrying capacity of pile

= Qs = Re/3 + Raf/6 {IRC: 78-2014)}

= (Ksp x qc x df x Ab)/3 + (As x C_{us})/6

= {(1.03 x 201 x 1.20 x 7850.00)/3} + {(21994.0 x 3.19)/6}

Qs = 661768.0 kg

= 662.00 ton

Considering the above approaches, **recommended safe vertical pile capacity is 400 t.**

THE SAFE UPLIFT CAPACITY OF PILE:

Ultimate skin friction of pile = 1.03 x 201 x 1.20 x 7850.00 = 1950222.6kg= 1950.22 t.

Safe uplift capacity of pile = 1/3 x (1950.22) x 0.70 = 455.05 t.

Recommended safe uplift pile capacity is 300 t.

CALCULATION OF DEPTH OF FIXITY OF PILE:

The depth of fixity of piles has been calculated as per Amendment No. 3 to I.S: 2911 (Part I/Sec 2).Refer Appendix – C

Grade of concrete of piles = M 30 Diameter of piles = 1000 mm

E = 5000√ (fck) = 27386.10 N/mm² = 273861 Kg/cm²
Moment of inertia of pile = 4908738.5 Cm^4

KB= 28.80 Kg/cm^2

R = (E I / KB) 1/4 = 464.81 Cm

From fig - 4 of I.S: 2911 (Part I /Sec 2)

L1 =0.00 cm

L1 / R = 0.0, Lf / R = 2.12 (For fixed head pile)

Therefore Lf = 985.40 Cm = **9.85 m.**

Under Lateral Load, considering the allowable horizontal deflection of pile at GL = 0.50cm

Lateral load for fixed head pile:

For fixed head (Q):

$Q = 12EIy / (L1+Lf)^3$

$Q = 12 \times 273861 \times 4908738.5 \times 0.50 /(985.40)^3 =$ **8.40t.**

BEARING CAPACITY ANALYSIS FOR FOUNDATIONS ON ROCK

Analysis as per IS 12070-1987

LOCATION: BH-GT-36

BEARING CAPACITY ANALYSIS FOR OPEN FOUNDATIONS BEARING ON ROCK HAS BEEN DONE BY THREE DIFFERENT METHODS AS GIVEN BELOW:

1. Presumptive Values of safe bearing capacity as per Clause 5.2 of IS 12070-1987
2. Estimate of safe bearing pressure from core strength Clause 6.2 of IS 12070-1987
3. Estimate of Net safe bearing Capacity from Teng's method

Rock Type:	Moderately to slightly weathered greyish fine to medium grained hard metamorphic rock.		
Foundation Depth below EGL (m):	3.0	m	
Below Founding Level :	Rock Core Recovery(%):	77	
	RQD value (%)	55	

Presumptive Values: Clause 5.2 of IS 12070-1987

qnet safe = qs*csub*cc*cs

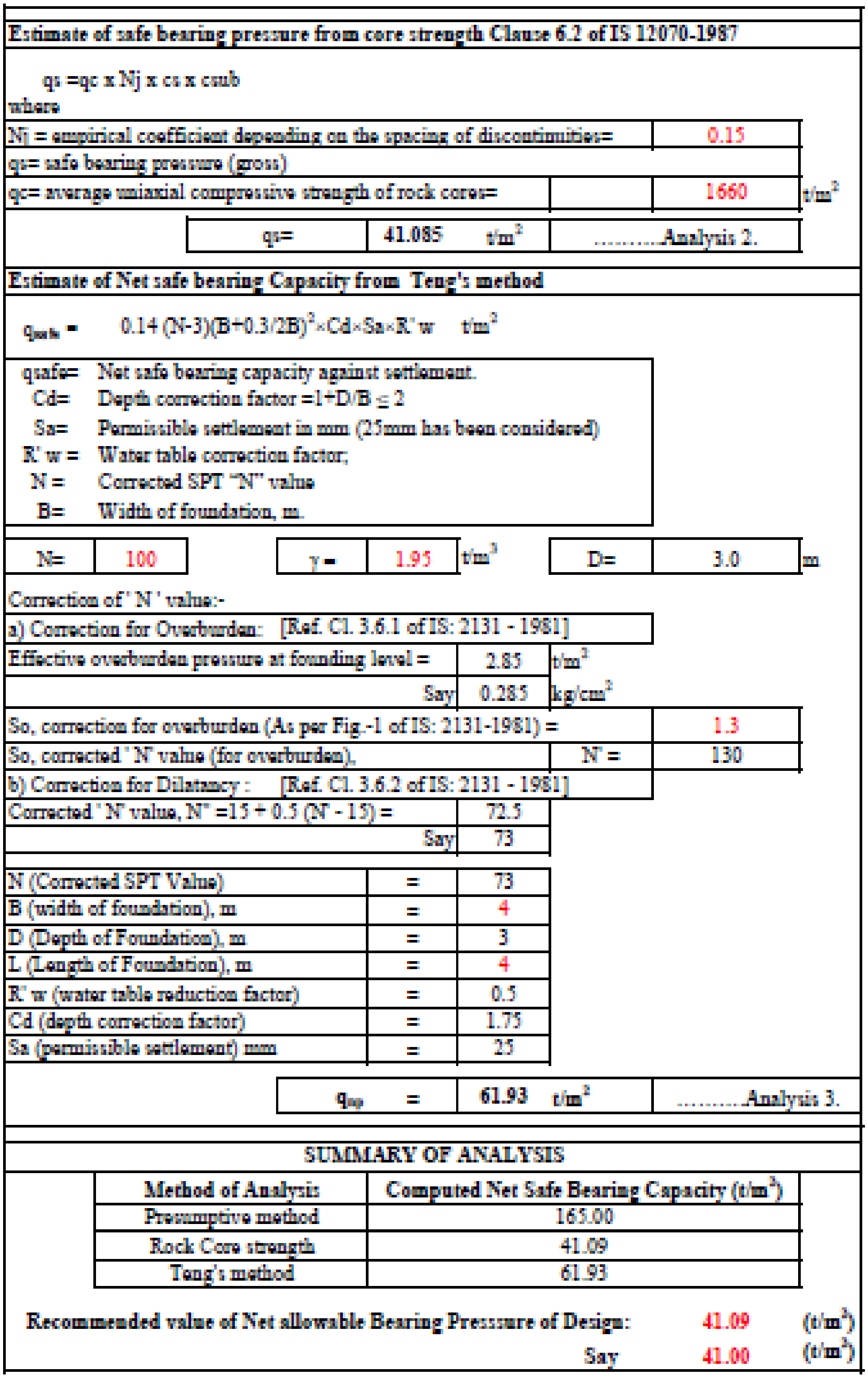
where,
qnet safe = safe net bearing capacity
qs = safe bearing capacity
cs = correction for orientation of joints
csub = correction for saturation / submerged condition
cc= correction for solution cavities (in limestone)

Net safe Bearing Pressure based on rock classification:

Material	qnet safe, t/m²
Massive crystalline bed rock including granite ,diorite,gneiss,trap rock	1000.00
Foliated rocks such as schists or slate in sound condition	400.00
Bedded limestone in sound condition	400.00
Sedimentary rock,including hard shales and sandstones	250.00
Soft or broken bed rock (excluding shale)and soft limestone	100.00
Soft shale	40.00

Presumptive Value of safe bearing capacity for design:	qs =	1000	t/m²
correction for saturation / submerged condition	csub =	0.5	
Correction for orientation of joints	cs =	0.33	
correction for solution cavities (in limestone)	cc =	....	

qnet safe=	165.00 t/m²	..........Analysis 1.



Estimate of safe bearing pressure from core strength Clause 6.2 of IS 12070-1987

qs =qc x Nj x cs x csub
where

Nj = empirical coefficient depending on the spacing of discontinuities=	0.15	
qs= safe bearing pressure (gross)		
qc= average uniaxial compressive strength of rock cores=	1660	t/m^2

qs=	41.085 t/m^2	……….Analysis 2.

Estimate of Net safe bearing Capacity from Teng's method

q_{safe} = 0.14 (N-3)(B+0.3/2B)^2×Cd×Sa×R' w t/m^2

qsafe= Net safe bearing capacity against settlement.
Cd= Depth correction factor =1+D/B ≤ 2
Sa= Permissible settlement in mm (25mm has been considered)
R' w = Water table correction factor;
N = Corrected SPT "N" value
B= Width of foundation, m.

N=	100	γ =	1.95	t/m^3	D=	3.0	m

Correction of ' N ' value:-

a) Correction for Overburden: [Ref. Cl. 3.6.1 of IS: 2131 - 1981]			
Effective overburden pressure at founding level =		2.85	t/m^2
	Say	0.285	kg/cm^2
So, correction for overburden (As per Fig.-1 of IS: 2131-1981) =		1.3	
So, corrected ' N' value (for overburden),	N' =	130	
b) Correction for Dilatancy : [Ref. Cl. 3.6.2 of IS: 2131 - 1981]			
Corrected ' N' value, N" =15 + 0.5 (N' - 15) =		72.5	
	Say	73	

N (Corrected SPT Value)	=	73
B (width of foundation), m	=	4
D (Depth of Foundation), m	=	3
L (Length of Foundation), m	=	4
R' w (water table reduction factor)	=	0.5
Cd (depth correction factor)	=	1.75
Sa (permissible settlement) mm	=	25

q_{np}	=	61.93 t/m^2	……….Analysis 3.

SUMMARY OF ANALYSIS

Method of Analysis	Computed Net Safe Bearing Capacity (t/m^2)
Presumptive method	165.00
Rock Core strength	41.09
Teng's method	61.93

Recommended value of Net allowable Bearing Presssure of Design: 41.09 (t/m^2)
Say 41.00 (t/m^2)

BEARING CAPACITY BASED ON SHEAR CRITERIA

BH-87A

(Based on IS: 6403-1981)

Unit weight of soil (γ) = 1.88 t/m^3

Submerged unit of soil (γ') = 0.880 t/m^3

Type of footing : Strip footing

Width of footing (B) = 4.5 m

Length of footing(L) = 9 m

Depth of footing from NGL (D_f) = 1.5 m

Angle of internal friction (ϕ) = 25 deg.

If ϕ value is in between local & general shear failure. As per IS: 6403 - 1981 the SBC value is to be interpolated between

ϕ = 36 deg (for general shear failure)

ϕ = 28 deg (for local shear failure)

A) Local shear failure :

$\phi' = \tan^{-1} (0.67 \tan\phi)$ = 17.35 deg.

Cohesion (C) = 0 t/m^2

Bearing capacity factors

N_c' = 12.599

N_q' = 4.94

N_γ' = 3.71

Shape factors :

Sc	=	1.00
Sq	=	1.00
S_γ	=	1.00

Inclination factors :
$Ic = Iq = I_\gamma = 1$

Depth factors :

dc	=	1.09
dq	=	1.05
d_γ	=	1.05

Effective overburden pressure (q) = 1.3 t/m^2

Factor of safety (F.S) = 2.5

Ultimate bearing capacity (UBC)

$UBC = q * (Nq' - 1) * Sq * dq * Iq + 0.5 * B * \gamma * N\gamma' * S_\gamma * d_\gamma * I_\gamma * w$

Where w = Water table correction factor
w = 0.5

Ultimate bearing capacity (Local) = 13.693 t/m^2

Safe bearing capacity as per shear criteria,

(SBC) Local = UBC/F.S = 5.5 t/m^2

From the settlement consideration, safe bearing capacity= 0.91 t/m^2

Immediate settlement (For Cohesionless soil)

$S_i = qB(1-\mu^2)\, I_R / E_s$

Where,
q = Intensity of Pressure = 0.91 T/m^2
B = Least lateral dimension = Width footing = 4.50 m
μ = Poisson's Ratio = 0.30
Es =Modulus of Elasticit assumed to be constant with depth
Es (T/m2) 570 T/m2
I_R = Influence factor depending on shape of footing and its rigidity (Ref. IS 8009(Part I), 1976, Table 2.
= 1.53

$S_i = qB(1-\mu^2)\, I_R / E_s =$ 10.0 mm

8.0 DISCUSSIONS ON FOUNDATION

The structure for which the Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor. Considering the above factor deep foundation in the form of R.C.C. bored cast-in-situ piles and open foundation in the form of strip footings are are suggested for the discussion. The capacities for such shallow foundation along are tabulated below.

GT -01

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**20.00m**	**5**	**2**	**0.6**	**2.77**
1000			**194**	**51**	**7.9**	**10.05**
1200			**300**	**67**	**10.6**	**11.64**

GT -02

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**20.00m**	**5**	**2**	**1.0**	**2.34**
1000			**206**	**47**	**13.2**	**8.49**
1200			**317**	**60**	**17.6**	**9.82**

GT -04

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**16.00m**	**4**	**2**	**0.70**	**2.62**
1000			**164**	**33**	**9.40**	**9.49**
1200			**235**	**41**	**12.6**	**10.98**

GT -05

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**18.00m**	**4**	**2**	**0.9**	**2.41**
1000			**164**	**33**	**12.0**	**8.75**
1200			**234**	**40**	**16.1**	**10.13**

GT -06

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**20.00m**	**6**	**3**	**0.3**	**3.45**
1000			**209**	**49**	**4.1**	**12.52**
1200			**321**	**62**	**5.5**	**14.49**

GT -07

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**16.00m**	**15**	**8**	**1.7**	**1.97**
1000			**400**	**300**	**8.4**	**9.85**
1200			**500**	**350**	**10.1**	**11.82**

GT -08

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**9.00m**	**10**	**5**	**0.5**	**3.01**
1000			**250**	**120**	**6.2**	**10.90**
1200			**350**	**180**	**8.3**	**12.62**

GT -09

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**18.00m**	**7**	**3**	**0.7**	**2.62**
1000			**214**	**51**	**9.4**	**9.49**
1200			**340**	**71**	**12.6**	**10.98**

GT -10

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**18.00m**	**13**	**7**	**1.7**	**1.97**
1000			**233**	**61**	**8.4**	**9.85**
1200			**323**	**74**	**10.1**	**11.82**

GT -11

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**35.00m**	**15**	**10**	**2**	**15**
1000			**350**	**150**	**10**	**350**
1200			**450**	**200**	**12**	**450**

GT -12

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**30.00m**	**8**	**3**	**0.5**	**3.01**
1000			**200**	**60**	**6.2**	**10.90**
1200			**300**	**80**	**8.3**	**12.62**

GT -13

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**18.00m**	**6**	**3**	**1**	**2.34**
1000			**180**	**40**	**5**	**11.72**
1200			**250**	**50**	**6**	**14.06**

GT -14

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**24.00m**	**12**	**6**	**1.7**	**1.97**
1000			**300**	**90**	**8.4**	**9.85**
1200			**430**	**100**	**10.1**	**11.82**

GT -15

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**24.00m**	**16**	**9**	**1.7**	**1.97**
1000			**230**	**60**	**8.4**	**9.85**
1200			**350**	**80**	**10.1**	**11.82**

GT -16

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**38.00m**	**22**	**12**	**1.7**	**1.97**
1000			**350**	**120**	**8.4**	**9.85**
1200			**450**	**160**	**10.1**	**11.82**

GT -17

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**38.00m**	**16**	**8**	**1.2**	**16**
1000			**300**	**100**	**5.9**	**300**
1200			**450**	**140**	**7.1**	**450**

GT -18

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**34.00m**	**18**	**9**	**1.7**	**1.97**
1000			**300**	**100**	**8.4**	**9.85**
1200			**450**	**150**	**10.1**	**11.82**

GT -19

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**14.00m**	**12**	**8**	**1**	**2.34**
1000			**320**	**150**	**5**	**11.72**
1200			**450**	**200**	**6**	**14.06**

GT -20

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**33.00m**	**5**	**3**	**1.4**	**2.11**
1000			**120**	**60**	**6.8**	**10.59**
1200			**180**	**100**	**8.2**	**12.71**

GT -21

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**14.00m**	**16**	**10**	**1.1**	**2.29**
1000			**350**	**200**	**5.4**	**11.44**
1200			**450**	**250**	**6.5**	**13.73**

GT -22

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**34.00m**	**16**	**8**	**1.70**	**1.97**
1000			**300**	**100**	**8.40**	**9.85**
1200			**450**	**140**	**10.1**	**11.82**

GT -23

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**21.00m**	**12**	**8**	**1.70**	**1.97**
1000			**250**	**150**	**8.40**	**9.85**
1200			**400**	**200**	**10.1**	**11.82**

GT -24

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**20.00m**	**15**	**8**	**2**	**1.86**
1000			**180**	**55**	**10**	**9.32**
1200			**280**	**70**	**12**	**11.18**

GT -25

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**24.00m**	**20**	**12**	**2**	**1.86**
1000			**200**	**60**	**10**	**9.32**
1200			**300**	**80**	**12**	**11.18**

GT -26

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**16.00m**	**12**	**6**	**1.70**	**1.97**
1000			**180**	**40**	**8.40**	**9.85**
1200			**280**	**50**	**10.1**	**11.82**

GT -27

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**21.00m**	**22**	**14**	**1.2**	**2.22**
1000			**350**	**250**	**5.9**	**11.08**
1200			**450**	**300**	**7.1**	**13.29**

GT -28

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**14.00m**	**5**	**2**	**0.5**	**3.01**
1000			**140**	**25**	**6.2**	**10.90**
1200			**210**	**30**	**8.3**	**12.62**

GT -29

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**24.00m**	**7**	**3**	**1.4**	**2.11**
1000			**250**	**50**	**6.8**	**10.59**
1200			**400**	**80**	**8.2**	**12.71**

GT -30

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**15.00m**	**20**	**12**	**1.70**	**1.97**
1000			**300**	**150**	**8.40**	**9.85**
1200			**450**	**200**	**10.1**	**11.82**

GT -31

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**20.00m**	**12**	**6**	**1.4**	**2.11**
1000			**150**	**40**	**6.8**	**10.59**
1200			**250**	**50**	**8.2**	**12.71**

GT -32

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**10.00m**	**22**	**14**	**1**	**2.34**
1000			**350**	**200**	**13.2**	**8.49**
1200			**450**	**300**	**17.6**	**9.82**

GT -33

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**16.00m**	**20**	**12**	**1.7**	**1.97**
1000			**300**	**200**	**8.4**	**9.85**
1200			**420**	**250**	**10.1**	**11.82**

GT -34

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**18.50m**	**15**	**8**	**1**	**2.34**
1000			**250**	**150**	**13.2**	**8.49**
1200			**400**	**200**	**17.6**	**9.82**

GT -35

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**18.00m**	**15**	**7**	**2**	**1.86**
1000			**220**	**50**	**10**	**9.32**
1200			**340**	**60**	**12**	**11.18**

GT -36

Foundation Type	Length x Width of footing (m), L x B	Depth of foundation below EGL(m)	Net safe bearing capacity (t/m^2)	Permissible settlement (mm)
Open foundation	4.0 x 4.0	3.00	41.00	50
	5.0 x 5.0		41.00	50
	4.0 x 4.0	4.50	44.00	50
	5.0 x 5.0		44.00	50

GT -36B

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**9.00m**	**22**	**14**	**2**	**1.86**
1000			**300**	**200**	**10**	**9.32**
1200			**420**	**250**	**12**	**11.18**

GT -37

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**22.00m**	**22**	**14**	**0.7**	**2.62**
1000			**350**	**200**	**9.4**	**9.49**
1200			**450**	**300**	**12.6**	**10.98**

GT -38

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**25.00m**	**8**	**4**	**1.2**	**2.21**
1000			**220**	**50**	**5.9**	**11.08**
1200			**350**	**80**	**7.1**	**13.29**

GT -39

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**10.00m**	**20**	**12**	**2.3**	**1.78**
1000			**300**	**200**	**30.1**	**6.48**
1200			**420**	**250**	**40.3**	**7.46**

GT -40

Foundation Type	Length x Width of footing (m), L x B	Depth of foundation below EGL(m)	Net safe bearing capacity (t/m^2)	Permissible settlement (mm)
Open foundation	4.0 x 4.0	4.50	38.00	50
	5.0 x 5.0		38.00	50
	4.0 x 4.0	6.00	42.00	50
	5.0 x 5.0		42.00	50

GT -41

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**19.00m**	**16**	**8**	**2**	**16**
1000			**220**	**60**	**10**	**220**
1200			**350**	**70**	**12**	**350**

GT -42

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**9.00m**	**18**	**12**	**2**	**1.86**
1000			**250**	**150**	**10**	**9.32**
1200			**350**	**200**	**12**	**11.18**

GT -43

Foundation Type	Length x Width of footing (m), L x B	Depth of foundation below EGL(m)	Net safe bearing capacity (t/m^2)	Permissible settlement (mm)
Open foundation	4.0 x 4.0	4.50	38.00	50
	5.0 x 5.0		38.00	50
	4.0 x 4.0	6.00	36.00	50
	5.0 x 5.0		36.00	50

GT -44

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**19.00m**	**22**	**14**	**1.4**	**2.11**
1000			**300**	**160**	**6.8**	**10.59**
1200			**450**	**200**	**8.2**	**12.71**

GT -44A

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**15.00m**	**25**	**15**	**2.30**	**1.78**
1000			**350**	**220**	**30.1**	**6.44**
1200			**450**	**260**	**40.3**	**7.46**

GT -44B

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**20.00m**	**28**	**18**	**2.30**	**1.78**
1000			**380**	**250**	**30.1**	**6.48**
1200			**460**	**300**	**40.3**	**7.46**

GT -45

Foundation Type	Length x Width of footing (m), L x B	Depth of foundation below EGL(m)	Net safe bearing capacity (t/m^2)	Permissible settlement (mm)
Open foundation	4.0 x 4.0	4.50	38.00	50
	5.0 x 5.0		38.00	50
	4.0 x 4.0	6.00	36.00	50
	5.0 x 5.0		36.00	50

GT -46

Foundation Type	Length x Width of footing (m), L x B	Depth of foundation below EGL(m)	Net safe bearing capacity (t/m^2)	Permissible settlement (mm)
Open foundation	4.0 x 4.0	3.00	44.00	50
	5.0 x 5.0		44.00	50
	4.0 x 4.0	4.50	51.00	50
	5.0 x 5.0		51.00	50

GT -47

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**16.00m**	**11**	**5**	**2**	**1.86**
1000			**180**	**40**	**10**	**9.32**
1200			**260**	**50**	**12**	**11.18**

GT -48

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**16.00m**	**12**	**6**	**1.0**	**2.34**
1000			**200**	**50**	**13.2**	**8.49**
1200			**300**	**60**	**17.6**	**9.82**

GT -49

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**13.00m**	**16**	**10**	**1.4**	**2.11**
1000			**300**	**150**	**6.8**	**10.59**
1200			**450**	**200**	**8.2**	**12.71**

GT -50

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**20.00m**	**22**	**12**	**0.50**	**2.30**
1000			**483**	**79**	**12.50**	**11.65**
1200			**691.0**	**101**	**18.00**	**13.98**

GT -51

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**22.00m**	**23**	**14**	**0.40**	**2.50**
1000			**514**	**88**	**10.60**	**12.31**
1200			**737**	**112**	**15.30**	**14.77**

GT -52

Foundation Type	Length x Width of footing (m), L x B	Depth of foundation below EGL(m)	Net safe bearing capacity (t/m^2)	Permissible settlement (mm)
Open foundation	4.0 x 4.0	4.50	39.00	50
	5.0 x 5.0		39.00	50
	4.0 x 4.0	6.00	52.10	50
	5.0 x 5.0		52.10	50

GT -53

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**15.50m**	**16**	**11**	**1.70**	**1.60**
1000			**335**	**71**	**41.70**	**7.80**
1200			**479**	**91**	**61.10**	**9.40**

GT -54

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**20.00m**	**8**	**7**	**0.80**	**2.00**
1000			**346**	**170**	**51.40**	**7.30**
1200			**553**	**244**	**82.60**	**8.40**

GT -55

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**13.50m**	**22**	**9**	**0.30**	**2.80**
1000			**496**	**60**	**19.60**	**10.0**
1200			**710**	**76**	**31.50**	**11.60**

GT -56

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**12.50m**	**148**	**95**	**2.00**	**1.50**
1000			**738**	**486**	**51.10**	**7.30**
1200			**886**	**586**	**73.60**	**8.70**

GT -57

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**11.00m**	**16**	**8**	**0.40**	**2.50**
1000			**325**	**53**	**27.40**	**9.00**
1200			**465**	**66**	**44.0**	**10.40**

GT -58

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**18.00m**	**21**	**11**	**0.50**	**2.30**
1000			**449**	**70**	**12.80**	**11.6**
1200			**642**	**90**	**18.50**	**13.90**

GT -59

Foundation Type	Length x Width of footing (m), L x B	Depth of foundation below EGL(m)	Net safe bearing capacity (t/m^2)	Permissible settlement (mm)
Open foundation	4.0 x 4.0	4.50	51.00	50
	5.0 x 5.0		51.00	50
	4.0 x 4.0	6.00	57.00	50
	5.0 x 5.0		57.00	50

GT -60

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**19.00m**	**20**	**17**	**2.20**	**1.40**
1000			**336**	**129**	**54.50**	**7.13**
1200			**529**	**168**	**78.50**	**8.55**

GT -61

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**16.00m**	**18**	**12**	**0.30**	**2.90**
1000			**377**	**75**	**16.50**	**10.60**
1200			**538**	**94**	**26.50**	**12.30**

GT -62

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**13.00m**	**22**	**9**	**0.80**	**2.00**
1000			**476**	**59**	**19.30**	**10.10**
1200			**682**	**75**	**27.80**	**12.10**

GT -63

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**15.50m**	**22**	**9**	**0.30**	**2.80**
1000			**485**	**59**	**6.80**	**14.3**
1200			**694**	**75**	**9.80**	**17.10**

GT -64

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**10.00m**	**15**	**8**	**0.50**	**2.40**
1000			**304**	**51**	**11.50**	**12.00**
1200			**434**	**64**	**16.50**	**14.40**

GT -65

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**13.00m**	**17**	**11**	**0.70**	**2.10**
1000			**346**	**65**	**16.30**	**10.70**
1200			**495**	**81**	**23.50**	**12.80**

GT -66

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**13.50m**	**2.2**	**3.5**	**0.30**	**2.80**
1000			**201**	**53**	**6.80**	**14.30**
1200			**342**	**74**	**9.80**	**17.10**

GT -67

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**10.50m**	**16**	**9**	**1.10**	**1.80**
1000			**338**	**56**	**27.40**	**9.00**
1200			**483**	**70**	**39.50**	**10.80**

GT -68

Foundation Type	Length x Width of footing (m), L x B	Depth of foundation below EGL(m)	Net safe bearing capacity (t/m^2)	Permissible settlement (mm)
Open foundation	4.0 x 4.0	5.50	115	50
	5.0 x 5.0		115	50

GT -69

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**17.00m**	**19**	**9**	**0.70**	**2.10**
1000			**397**	**59**	**16.30**	**10.70**
1200			**568**	**74**	**23.50**	**12.80**

GT -70

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**11.00m**	**23**	**8**	**0.50**	**2.30**
1000			**518**	**52**	**12.40**	**11.70**
1200			**741**	**66**	**17.90**	**14.0**

GT -71

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**14.00m**	**17**	**9**	**0.50**	**2.30**
1000			**358**	**61**	**13.10**	**11.50**
1200			**512**	**77**	**18.90**	**13.70**

GT -72

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**21.00m**	**26**	**13**	**0.90**	**1.90**
1000			**583**	**86**	**22.10**	**9.60**
1200			**836**	**109**	**31.80**	**11.60**

GT -73

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**11.00m**	**15**	**10**	**1.20**	**1.70**
1000			**309**	**59**	**30.0**	**8.70**
1200			**441**	**74**	**43.10**	**10.40**

GT -74

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**11.00m**	**13**	**9**	**0.80**	**2.00**
1000			**262**	**56**	**19.30**	**10.10**
1200			**374**	**70**	**27.80**	**12.10**

GT -75

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**22.00m**	**7.8**	**7.8**	**0.40**	**2.50**
1000			**202**	**144**	**9.70**	**12.70**
1200			**313**	**204**	**14.0**	**15.20**

GT -76

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**18.00m**	**15**	**12**	**1.20**	**1.70**
1000			**313**	**77**	**30.0**	**8.70**
1200			**447**	**97**	**43.10**	**10.40**

GT -77

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**14.50m**	**14**	**9**	**0.70**	**2.10**
1000			**275**	**58**	**16.30**	**10.70**
1200			**392**	**74**	**23.50**	**12.80**

GT -78

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**28.00m**	**21**	**19**	**0.80**	**2.0**
1000			**237**	**145**	**50.70**	**7.30**
1200			**356**	**189**	**81.50**	**8.50**

GT -79

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**28.00m**	**22**	**20**	**0.30**	**2.80**
1000			**112**	**126**	**19.60**	**10.00**
1200			**135**	**159**	**31.50**	**11.60**

GT -80

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**28.00m**	**25.9**	**23**	**1.00**	**1.90**
1000			**289**	**189**	**24.70**	**9.30**
1200			**427**	**249**	**35.50**	**11.10**

GT -81

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**36.00m**	**13**	**8**	**0.7**	**2.62**
1000			**300**	**200**	**9.4**	**9.49**
1200			**450**	**280**	**12.6**	**10.98**

GT -82

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**24.00m**	**18**	**11**	**0.5**	**3.01**
1000			**350**	**200**	**6.2**	**10.90**
1200			**450**	**300**	**8.3**	**12.62**

GT -83

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**21.00m**	**11**	**7**	**1**	**2.34**
1000			**250**	**140**	**5**	**11.72**
1200			**350**	**200**	**6**	**14.06**

GT -84

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**21.00m**	**12**	**8**	**1**	**2.34**
1000			**250**	**150**	**5**	**11.72**
1200			**350**	**200**	**6**	**14.06**

GT -85

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**32.00m**	**17**	**11**	**0.9**	**2.41**
1000			**350**	**200**	**12.0**	**8.75**
1200			**450**	**250**	**16.1**	**10.13**

GT -86

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**24.00m**	**13**	**8**	**1.0**	**2.34**
1000			**260**	**180**	**13.2**	**8.49**
1200			**400**	**260**	**17.6**	**9.82**

GT -86A

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**18.00m**	**14**	**7**	**0.5**	**3.01**
1000			**80**	**30**	**6.2**	**10.90**
1200			**110**	**40**	**8.3**	**12.62**

GT -87

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**41.00m**	**26**	**15**	**0.5**	**3.01**
1000			**350**	**200**	**6.2**	**10.90**
1200			**480**	**260**	**8.3**	**12.62**

GT -87A

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**25.00m**	**18**	**9**	**0.9**	**2.41**
1000			**140**	**60**	**12**	**8.75**
1200			**180**	**70**	**16.1**	**10.13**

GT -88

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**28.00m**	**14**	**9**	**0.5**	**3.01**
1000			**260**	**160**	**6.2**	**10.90**
1200			**400**	**260**	**8.3**	**12.62**

GT -89

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**15.00m**	**10**	**5**	**1.7**	**1.97**
1000			**200**	**40**	**8.4**	**9.85**
1200			**260**	**50**	**10.1**	**11.85**

GT -90

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**13.00m**	**22**	**14**	**1.7**	**1.97**
1000			**350**	**200**	**8.4**	**9.85**
1200			**450**	**300**	**10.1**	**11.85**

GT -91

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**18.00m**	**11**	**7**	**0.7**	**2.62**
1000			**200**	**100**	**9.4**	**9.49**
1200			**260**	**150**	**12.6**	**10.98**

GT -92

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**38.00m**	**14**	**7**	**1.0**	**2.34**
1000			**280**	**80**	**13.2**	**8.49**
1200			**400**	**100**	**17.6**	**9.82**

GT -93

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**25.00m**	**13**	**8**	**0.5**	**3.01**
1000			**250**	**150**	**6.2**	**10.90**
1200			**300**	**200**	**8.3**	**12.62**

GT -94

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**28.00m**	**13**	**8**	**2**	**1.86**
1000			**250**	**150**	**10**	**9.32**
1200			**300**	**200**	**12**	**11.18**

GT -95

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**22.00m**	**12**	**6**	**0.5**	**3.01**
1000			**180**	**40**	**6.2**	**10.90**
1200			**280**	**50**	**8.3**	**12.62**

GT -96

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**18.00m**	**16**	**9**	**1.4**	**2.11**
1000			**110**	**40**	**6.8**	**10.59**
1200			**140**	**50**	**8.2**	**12.71**

GT -97

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**23.00m**	**15**	**9**	**2**	**1.86**
1000			**280**	**160**	**10**	**9.32**
1200			**320**	**200**	**12**	**11.18**

GT -98

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**18.00m**	**24**	**15**	**1.0**	**2.34**
1000			**350**	**200**	**13.2**	**8.49**
1200			**450**	**300**	**17.6**	**9.82**

GT -99

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**18.00m**	**6**	**3**	**1.0**	**2.34**
1000			**200**	**40**	**13.2**	**8.49**
1200			**300**	**50**	**17.6**	**9.82**

GT -100

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**13.50m**	**17**	**10**	**0.70**	**2.00**
1000			**355**	**62**	**48.0**	**7.40**
1200			**508**	**78**	**77.1**	**8.60**

GT -101

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**12.50m**	**148**	**95**	**0.80**	**2.00**
1000			**738**	**486**	**20.70**	**9.80**
1200			**886**	**586**	**29.80**	**11.80**

GT -102

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**17.50m**	**148**	**95**	**0.40**	**2.50**
1000			**738**	**492**	**9.70**	**12.70**
1200			**886**	**595**	**14.0**	**15.2**

GT -103

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**21.00m**	**18**	**13**	**0.90**	**1.90**
1000			**385**	**83**	**22.10**	**9.60**
1200			**551**	**105**	**31.80**	**11.60**

GT -104

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**22.50m**	**21**	**15**	**1.0**	**1.90**
1000			**469**	**96**	**24.70**	**9.30**
1200			**672**	**122**	**35.50**	**11.10**

GT -105

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**18.00m**	**13**	**15**	**0.90**	**1.90**
1000			**291**	**90**	**58.69**	**6.90**
1200			**417**	**113**	**94.50**	**8.0**

GT -106

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**19.50m**	**5**	**4.7**	**0.60**	**2.20**
1000			**226**	**94**	**41.60**	**7.80**
1200			**371**	**134**	**66.80**	**9.00**

GT -107

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**15.50m**	**148**	**95**	**0.50**	**2.30**
1000			**738**	**489**	**32.20**	**8.50**
1200			**886**	**591**	**51.80**	**9.50**

GT -108

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**19.50m**	**13**	**11**	**0.50**	**2.30**
1000			**278**	**99**	**33.70**	**8.40**
1200			**448**	**131**	**54.20**	**9.70**

GT -109

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**16.50m**	**13.1**	**10**	**0.70**	**2.10**
1000			**277**	**63**	**17.0**	**10.50**
1200			**447**	**81**	**24.5**	**12.60**

GT -110

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**19.50m**	**6**	**5**	**0.30**	**2.70**
1000			**293**	**119**	**21.40**	**9.70**
1200			**478**	**171**	**34.30**	**11.30**

GT -111

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**20.00m**	**5.8**	**5**	**0.50**	**2.30**
1000			**242**	**109**	**35.2**	**8.30**
1200			**393**	**156**	**56.5**	**9.50**

GT -112

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**31.00m**	**12.9**	**13**	**0.50**	**2.30**
1000			**241**	**162**	**35.20**	**8.30**
1200			**373**	**224**	**56.50**	**9.50**

GT -113

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**25.00m**	**13.5**	**12**	**0.60**	**2.20**
1000			**352**	**177**	**39.80**	**7.90**
1200			**557**	**247**	**63.90**	**9.20**

GT -114

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**33.50m**	**21.4**	**19**	**0.70**	**2.10**
1000			**306**	**151**	**43.70**	**7.70**
1200			**477**	**198**	**70.10**	**8.90**

GT -115

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**14.50m**	**7.7**	**6**	**0.80**	**2.00**
1000			**278**	**77**	**50.90**	**7.30**
1200			**459**	**107**	**81.70**	**8.40**

GT -116

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**14.00m**	**4**	**4**	**0.50**	**2.30**
1000			**236**	**61**	**35.50**	**8.20**
1200			**394**	**86**	**57.00**	**9.50**

GT -117

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**12.00m**	**17**	**10**	**0.90**	**1.90**
1000			**341**	**59**	**58.90**	**6.95**
1200			**486**	**74**	**94.50**	**8.00**

GT -118

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**15.00m**	**15**	**9**	**0.90**	**1.90**
1000			**295**	**61**	**23.10**	**9.50**
1200			**419**	**77**	**33.20**	**11.40**

GT -119

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**16.50m**	**13.8**	**12**	**0.90**	**1.90**
1000			**228**	**98**	**23.10**	**9.50**
1200			**359**	**129**	**33.20**	**11.40**

GT -120

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**13.50m**	**17**	**9**	**0.30**	**2.90**
1000			**348**	**59**	**16.50**	**10.60**
1200			**497**	**75**	**26.50**	**12.30**

GT -121

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**20.00m**	**148**	**95**	**2.0**	**1.50**
1000			**738**	**495**	**51.10**	**7.30**
1200			**886**	**599**	**73.60**	**8.70**

GT -122

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**22.50m**	**17.3**	**16**	**0.50**	**2.40**
1000			**207**	**119**	**30.70**	**8.60**
1200			**315**	**155**	**49.30**	**10.30**

GT -123

Pile diameter (mm)	Cut-off depth	Pile termination depth below EGL	Safe vertical capacity (t)	Uplift capacity (t)	Lateral capacity (t)	Length of fixity (m)
200	**2.00m below EGL**	**19.00m**	**17**	**15**	**0.6**	**2.20**
1000			**369**	**91**	**41.30**	**7.80**
1200			**528**	**114**	**66.30**	**9.00**

GT -01

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.77	10.00
	3.00m		1.13	10.00
	4.50m		0.98	10.00
	6.00m		0.84	10.00
	7.50m		0.84	10.00

GT -02

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	1.34	10.00
	3.00m		1.34	10.00
	4.50m		1.70	10.00
	6.00m		1.70	10.00
	7.50m		1.77	10.00

GT -04

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	1.05	10.00
	3.00m		1.05	10.00
	4.50m		1.70	10.00
	6.00m		1.70	10.00
	7.50m		2.56	10.00

GT -05

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	1.27	10.00
	3.00m		1.27	10.00
	4.50m		1.27	10.00
	6.00m		1.20	10.00
	7.50m		1.20	10.00

GT -06

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.91	10.00
	3.00m		0.91	10.00
	4.50m		1.13	10.00
	6.00m		1.13	10.00
	7.50m		1.84	10.00

GT -07

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.70	10.00
	3.00m		1.05	10.00
	4.50m		1.05	10.00
	6.00m		1.21	10.00
	7.50m		1.21	10.00

GT -08

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	1.05	10.00
	3.00m		0.98	10.00
	4.50m		1.27	10.00
	6.00m		3.50	10.00
	7.50m		3.85	10.00

GT -09

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	1.13	10.00
	3.00m		2.56	10.00
	4.50m		2.56	10.00
	6.00m		2.56	10.00
	7.50m		2.56	10.00

GT -10

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.70	10.00
	3.00m		1.05	10.00
	4.50m		1.05	10.00
	6.00m		1.05	10.00
	7.50m		1.05	10.00

GT -11

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.75	10.00
	3.00m		1.45	10.00
	4.50m		1.45	10.00
	6.00m		1.47	10.00
	7.50m		1.47	10.00

GT -12

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.77	10.00
	3.00m		0.77	10.00
	4.50m		0.32	10.00
	6.00m		0.32	10.00
	7.50m		0.32	10.00

GT -13

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.35	10.00
	3.00m		0.35	10.00
	4.50m		0.35	10.00
	6.00m		0.32	10.00
	7.50m		0.32	10.00

GT -14

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.53	10.00
	3.00m		0.97	10.00
	4.50m		0.79	10.00
	6.00m		0.69	10.00
	7.50m		0.69	10.00

GT -15

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.62	10.00
	3.00m		0.62	10.00
	4.50m		1.13	10.00
	6.00m		1.05	10.00
	7.50m		1.34	10.00

GT -16

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.53	10.00
	3.00m		0.53	10.00
	4.50m		0.53	10.00
	6.00m		0.53	10.00
	7.50m		0.53	10.00

GT -17

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.53	10.00
	3.00m		0.53	10.00
	4.50m		0.62	10.00
	6.00m		0.62	10.00
	7.50m		2.05	10.00

GT -18

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.75	10.00
	3.00m		1.01	10.00
	4.50m		1.01	10.00
	6.00m		1.01	10.00
	7.50m		1.01	10.00

GT -19

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.32	10.00
	3.00m		0.36	10.00
	4.50m		0.32	10.00
	6.00m		0.32	10.00
	7.50m		0.32	10.00

GT -20

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.54	10.00
	3.00m		0.54	10.00
	4.50m		0.54	10.00
	6.00m		0.54	10.00
	7.50m		0.98	10.00

GT -21

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.32	10.00
	3.00m		0.32	10.00
	4.50m		0.32	10.00
	6.00m		0.93	10.00
	7.50m		0.93	10.00

GT -20

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.54	10.00
	3.00m		0.54	10.00
	4.50m		0.54	10.00
	6.00m		0.54	10.00
	7.50m		0.98	10.00

GT -21

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.32	10.00
	3.00m		0.32	10.00
	4.50m		0.32	10.00
	6.00m		0.93	10.00
	7.50m		0.93	10.00

GT -22

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.95	10.00
	3.00m		0.95	10.00
	4.50m		0.95	10.00
	6.00m		0.95	10.00
	7.50m		0.95	10.00

GT -23

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.93	10.00
	3.00m		0.75	10.00
	4.50m		0.53	10.00
	6.00m		0.53	10.00
	7.50m		0.47	10.00

GT -24

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	1.52	10.00
	3.00m		1.24	10.00
	4.50m		0.94	10.00
	6.00m		0.75	10.00
	7.50m		0.63	10.00

GT -25

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	1.22	10.00
	3.00m		1.22	10.00
	4.50m		1.22	10.00
	6.00m		1.22	10.00
	7.50m		1.22	10.00

GT -26

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.95	10.00
	3.00m		0.86	10.00
	4.50m		0.59	10.00
	6.00m		0.53	10.00
	7.50m		1.18	10.00

GT -27

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.32	10.00
	3.00m		0.62	10.00
	4.50m		0.39	10.00
	6.00m		0.39	10.00
	7.50m		0.37	10.00

GT -28

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.83	10.00
	3.00m		0.83	10.00
	4.50m		1.27	10.00
	6.00m		1.27	10.00
	7.50m		3.49	10.00

GT -29

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.50	10.00
	3.00m		3.49	10.00
	4.50m		3.49	10.00
	6.00m		3.49	10.00
	7.50m		3.49	10.00

GT -30

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.62	10.00
	3.00m		0.73	10.00
	4.50m		0.80	10.00
	6.00m		0.91	10.00
	7.50m		0.91	10.00

GT -31

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.95	10.00
	3.00m		1.05	10.00
	4.50m		0.36	10.00
	6.00m		0.52	10.00
	7.50m		0.61	10.00

GT -32

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	1.34	10.00
	3.00m		1.48	10.00
	4.50m		0.47	10.00
	6.00m		0.85	10.00
	7.50m		3.49	10.00

GT -33

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.76	10.00
	3.00m		0.96	10.00
	4.50m		1.06	10.00
	6.00m		0.77	10.00
	7.50m		0.81	10.00

GT -34

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	1.48	10.00
	3.00m		1.70	10.00
	4.50m		1.63	10.00
	6.00m		0.64	10.00
	7.50m		0.68	10.00

GT -35

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.95	10.00
	3.00m		1.06	10.00
	4.50m		1.19	10.00
	6.00m		1.06	10.00
	7.50m		1.19	10.00

GT -36

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	3.50	10.00
	3.00m		3.85	10.00

GT -36A

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.68	10.00
	3.00m		0.68	10.00
	4.50m		3.50	10.00
	6.00m		4.21	10.00
	7.50m		4.93	10.00

GT -37

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	1.34	10.00
	3.00m		1.34	10.00
	4.50m		0.45	10.00
	6.00m		0.53	10.00
	7.50m		0.58	10.00

GT -38

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.36	10.00
	3.00m		0.52	10.00
	4.50m		1.70	10.00
	6.00m		1.91	10.00
	7.50m		2.20	10.00

GT -39

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	3.49	10.00
	3.00m		3.85	10.00
	4.50m		4.21	10.00
	6.00m		2.78	10.00
	7.50m		3.06	10.00

GT -40

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	1.24	10.00
	3.00m		3.50	10.00
	4.50m		3.85	10.00
	6.00m		4.21	10.00

GT -41

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.71	10.00
	3.00m		0.71	10.00
	4.50m		0.71	10.00
	6.00m		0.79	10.00
	7.50m		0.79	10.00

GT -42

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.70	10.00
	3.00m		0.70	10.00
	4.50m		0.70	10.00
	6.00m		3.50	10.00
	7.50m		3.85	10.00

GT -43

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.79	10.00
	3.00m		0.79	10.00
	4.50m		3.50	10.00
	6.00m		3.85	10.00
	7.50m		4.21	10.00

GT -44

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.45	10.00
	3.00m		0.45	10.00
	4.50m		0.60	10.00
	6.00m		0.60	10.00
	7.50m		0.60	10.00

GT -44A

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	3.14	10.00
	3.00m		3.50	10.00
	4.50m		4.21	10.00
	6.00m		4.79	10.00
	7.50m		5.29	10.00

GT -44B

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	3.14	10.00
	3.00m		3.50	10.00
	4.50m		4.07	10.00
	6.00m		4.79	10.00
	7.50m		5.29	10.00

GT -45

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.97	10.00
	3.00m		3.50	10.00
	4.50m		3.71	10.00
	6.00m		3.93	10.00
	7.50m		4.21	10.00

GT -46

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	3.35	10.00
	3.00m		3.50	10.00
	4.50m		3.71	10.00
	6.00m		3.93	10.00
	7.50m		4.21	10.00

GT -47

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.77	10.00
	3.00m		0.77	10.00
	4.50m		0.97	10.00
	6.00m		0.97	10.00
	7.50m		0.97	10.00

GT -48

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	1.20	10.00
	3.00m		1.20	10.00
	4.50m		0.97	10.00
	6.00m		0.97	10.00
	7.50m		0.97	10.00

GT -49

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.54	10.00
	3.00m		0.46	10.00
	4.50m		0.46	10.00
	6.00m		0.46	10.00
	7.50m		0.46	10.00

GT -50

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.20	10.00
	3.00m		0.30	10.00
	4.50m		0.40	10.00
	6.00m		1.60	10.00
	7.50m		2.10	10.00

GT -51

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	1.00	10.00
	3.00m		1.30	10.00
	4.50m		1.70	10.00
	6.00m		0.70	10.00
	7.50m		0.90	10.00

GT -52

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.60	10.00
	3.00m		0.90	10.00
	4.50m		3.80	10.00
	6.00m		6.50	10.00

GT -53

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	1.40	10.00
	3.00m		1.70	10.00
	4.50m		2.40	10.00
	6.00m		3.00	10.00
	7.50m		3.90	10.00

GT -54

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	7.50	10.00
	3.00m		6.80	10.00
	4.50m		6.50	10.00
	6.00m		13.40	10.00
	7.50m		13.50	10.00

GT -55

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	1.00	10.00
	3.00m		2.00	10.00
	4.50m		3.20	10.00
	6.00m		3.20	10.00
	7.50m		3.40	10.00

GT -56

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	1.30	10.00
	3.00m		2.00	10.00
	4.50m		5.50	10.00
	6.00m		8.80	10.00

GT -57

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	1.00	10.00
	3.00m		2.30	10.00
	4.50m		3.80	10.00
	6.00m		3.90	10.00
	7.50m		4.00	10.00

GT -58

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.60	10.00
	3.00m		0.70	10.00
	4.50m		0.90	10.00
	6.00m		1.10	10.00
	7.50m		1.40	10.00

GT -59

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	15.10	10.00
	3.00m		18.50	10.00

GT -60

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	2.80	10.00
	3.00m		3.30	10.00
	4.50m		4.30	10.00
	6.00m		4.90	10.00
	7.50m		5.80	10.00

GT -61

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	3.60	10.00
	3.00m		3.40	10.00
	4.50m		3.40	10.00
	6.00m		3.50	10.00
	7.50m		3.60	10.00

GT -62

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.70	10.00
	3.00m		1.10	10.00
	4.50m		2.00	10.00
	6.00m		5.40	10.00
	7.50m		5.50	10.00

GT -63

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.30	10.00
	3.00m		0.40	10.00
	4.50m		0.60	10.00
	6.00m		0.70	10.00
	7.50m		4.20	10.00

GT -64

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.40	10.00
	3.00m		0.50	10.00
	4.50m		0.90	10.00
	6.00m		1.30	10.00

GT -65

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	2.80	10.00
	3.00m		3.30	10.00
	4.50m		4.30	10.00
	6.00m		4.90	10.00
	7.50m		5.80	10.00

GT -66

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	Filled up ground	
	3.00m			
	4.50m			
	6.00m			
	7.50m			

GT -67

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.60	10.00
	3.00m		0.80	10.00
	4.50m		1.50	10.00
	6.00m		2.60	10.00

GT -68

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	8.00	10.00
	3.00m		7.30	10.00

GT -69

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.50	10.00
	3.00m		0.70	10.00
	4.50m		1.20	10.00
	6.00m		1.90	10.00
	7.50m		11.80	10.00

GT -70

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.40	10.00
	3.00m		0.60	10.00
	4.50m		1.00	10.00
	6.00m		1.70	10.00
	7.50m		12.70	10.00

GT -71

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.40	10.00
	3.00m		0.50	10.00
	4.50m		0.40	10.00
	6.00m		0.50	10.00
	7.50m		0.60	10.00

GT -72

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.70	10.00
	3.00m		0.80	10.00
	4.50m		1.10	10.00
	6.00m		1.30	10.00
	7.50m		1.40	10.00

GT -73

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	1.60	10.00
	3.00m		2.30	10.00
	4.50m		3.10	10.00
	6.00m		2.30	10.00
	7.50m		3.70	10.00

GT -74

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	5.10	10.00
	3.00m		1.00	10.00
	4.50m		1.40	10.00
	6.00m		2.00	10.00
	7.50m		2.90	10.00

GT -75

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.50	10.00
	3.00m		0.80	10.00
	4.50m		1.10	10.00
	6.00m		0.90	10.00
	7.50m		6.30	10.00

GT -76

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	1.00	10.00
	3.00m		1.30	10.00
	4.50m		1.50	10.00
	6.00m		1.90	10.00
	7.50m		2.30	10.00

GT -77

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.50	10.00
	3.00m		0.70	10.00
	4.50m		0.90	10.00
	6.00m		1.20	10.00
	7.50m		1.50	10.00

GT -78

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	9.10	10.00
	3.00m		8.20	10.00
	4.50m		7.80	10.00
	6.00m		7.90	10.00
	7.50m		8.00	10.00

GT -79

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	3.50	10.00
	3.00m		3.30	10.00
	4.50m		3.20	10.00
	6.00m		3.30	10.00
	7.50m		1.00	10.00

GT -80

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	4.30	10.00
	3.00m		4.00	10.00
	4.50m		1.10	10.00
	6.00m		1.50	10.00
	7.50m		1.90	10.00

GT -81

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.77	10.00
	3.00m		1.20	10.00
	4.50m		1.48	10.00
	6.00m		0.87	10.00
	7.50m		0.43	10.00

GT -82

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.98	10.00
	3.00m		1.63	10.00
	4.50m		0.54	10.00
	6.00m		0.43	10.00
	7.50m		0.75	10.00

GT -83

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.51	10.00
	3.00m		0.43	10.00
	4.50m		0.34	10.00
	6.00m		0.38	10.00
	7.50m		0.38	10.00

GT -84

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.51	10.00
	3.00m		0.43	10.00
	4.50m		0.46	10.00
	6.00m		0.44	10.00
	7.50m		1.48	10.00

GT -85

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	1.56	10.00
	3.00m		1.70	10.00
	4.50m		1.63	10.00
	6.00m		1.63	10.00
	7.50m		1.70	10.00

GT -86

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	2.05	10.00
	3.00m		1.70	10.00
	4.50m		1.77	10.00
	6.00m		1.15	10.00
	7.50m		0.77	10.00

GT -86A

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.91	10.00
	3.00m		0.98	10.00
	4.50m		0.99	10.00
	6.00m		0.97	10.00
	7.50m		1.07	10.00

GT -87

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.69	10.00
	3.00m		0.91	10.00
	4.50m		0.98	10.00
	6.00m		2.06	10.00
	7.50m		2.81	10.00

GT -87A

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.91	10.00
	3.00m		1.34	10.00
	4.50m		1.27	10.00
	6.00m		1.30	10.00
	7.50m		1.19	10.00

GT -88

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	1.05	10.00
	3.00m		0.91	10.00
	4.50m		1.56	10.00
	6.00m		1.77	10.00
	7.50m		1.06	10.00

GT -89

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.90	10.00
	3.00m		1.03	10.00
	4.50m		1.74	10.00
	6.00m		1.18	10.00
	7.50m		3.85	10.00

GT -90

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.85	10.00
	3.00m		1.01	10.00
	4.50m		1.23	10.00
	6.00m		1.41	10.00
	7.50m		1.60	10.00

GT -91

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	1.13	10.00
	3.00m		1.13	10.00
	4.50m		1.63	10.00
	6.00m		1.63	10.00
	7.50m		1.70	10.00

GT -92

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	1.56	10.00
	3.00m		1.56	10.00
	4.50m		1.70	10.00
	6.00m		1.70	10.00
	7.50m		1.70	10.00

GT -93

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	1.05	10.00
	3.00m		1.20	10.00
	4.50m		1.34	10.00
	6.00m		1.48	10.00
	7.50m		1.27	10.00

GT -94

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.67	10.00
	3.00m		0.67	10.00
	4.50m		0.86	10.00
	6.00m		0.94	10.00
	7.50m		0.67	10.00

GT -95

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.98	10.00
	3.00m		1.27	10.00
	4.50m		1.27	10.00
	6.00m		1.41	10.00
	7.50m		1.34	10.00

GT -96

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.59	10.00
	3.00m		0.75	10.00
	4.50m		0.75	10.00
	6.00m		1.30	10.00
	7.50m		1.49	10.00

GT -97

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.83	10.00
	3.00m		0.91	10.00
	4.50m		0.79	10.00
	6.00m		0.50	10.00
	7.50m		0.76	10.00

GT -98

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	1.84	10.00
	3.00m		1.92	10.00
	4.50m		0.67	10.00
	6.00m		0.55	10.00
	7.50m		0.55	10.00

GT -99

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.75	10.00
	3.00m		1.84	10.00
	4.50m		2.63	10.00
	6.00m		2.85	10.00
	7.50m		1.70	10.00

GT -100

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	6.40	10.00
	3.00m		8.50	10.00
	4.50m		6.30	10.00
	6.00m		6.40	10.00
	7.50m		10.20	10.00

GT -101

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.60	10.00
	3.00m		1.00	10.00
	4.50m		1.50	10.00
	6.00m		2.40	10.00
	7.50m		5.10	10.00

GT -102

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.30	10.00
	3.00m		0.40	10.00
	4.50m		0.50	10.00
	6.00m		0.70	10.00
	7.50m		0.70	10.00

GT -103

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.60	10.00
	3.00m		0.80	10.00
	4.50m		1.10	10.00
	6.00m		1.50	10.00
	7.50m		2.10	10.00

GT -104

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.70	10.00
	3.00m		1.10	10.00
	4.50m		1.50	10.00
	6.00m		2.10	10.00
	7.50m		3.10	10.00

GT -105

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	7.20	10.00
	3.00m		8.00	10.00
	4.50m		9.40	10.00
	6.00m		12.00	10.00
	7.50m		23.52	10.00

GT -106

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	5.20	10.00
	3.00m		4.80	10.00
	4.50m		5.70	10.00
	6.00m		6.50	10.00
	7.50m		8.20	10.00

GT -107

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	4.30	10.00
	3.00m		4.00	10.00
	4.50m		4.10	10.00
	6.00m		5.30	10.00
	7.50m		5.20	10.00

GT -108

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	5.40	10.00
	3.00m		4.90	10.00
	4.50m		4.60	10.00
	6.00m		4.80	10.00
	7.50m		4.80	10.00

GT -109

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	2.80	10.00
	3.00m		2.70	10.00
	4.50m		0.80	10.00
	6.00m		1.00	10.00
	7.50m		1.30	10.00

GT -110

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	2.90	10.00
	3.00m		3.00	10.00
	4.50m		3.00	10.00
	6.00m		3.30	10.00
	7.50m		5.30	10.00

GT -111

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	4.20	10.00
	3.00m		3.90	10.00
	4.50m		4.80	10.00
	6.00m		5.80	10.00
	7.50m		5.90	10.00

GT -112

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	5.50	10.00
	3.00m		5.10	10.00
	4.50m		5.20	10.00
	6.00m		4.40	10.00
	7.50m		5.10	10.00

GT -113

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	3.80	10.00
	3.00m		4.00	10.00
	4.50m		4.80	10.00
	6.00m		2.40	10.00
	7.50m		3.60	10.00

GT -114

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	4.20	10.00
	3.00m		4.40	10.00
	4.50m		3.80	10.00
	6.00m		5.00	10.00
	7.50m		5.30	10.00

GT -115

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	5.50	10.00
	3.00m		5.60	10.00
	4.50m		5.60	10.00
	6.00m		5.90	10.00
	7.50m		3.20	10.00

GT -116

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	4.10	10.00
	3.00m		4.00	10.00
	4.50m		4.10	10.00
	6.00m		4.40	10.00
	7.50m		5.10	10.00

GT -117

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	5.50	10.00
	3.00m		9.40	10.00
	4.50m		9.90	10.00
	6.00m		10.90	10.00

GT -118

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	3.80	10.00
	3.00m		1.30	10.00
	4.50m		2.20	10.00
	6.00m		4.30	10.00
	7.50m		4.40	10.00

GT -119

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	0.90	10.00
	3.00m		0.90	10.00
	4.50m		1.20	10.00
	6.00m		1.20	10.00
	7.50m		1.40	10.00

GT -120

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	4.30	10.00
	3.00m		4.00	10.00
	4.50m		3.00	10.00
	6.00m		3.10	10.00
	7.50m		3.60	10.00

GT -121

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	2.00	10.00
	3.00m		2.60	10.00
	4.50m		3.10	10.00
	6.00m		3.60	10.00
	7.50m		4.30	10.00

GT -122

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	3.40	10.00
	3.00m		3.70	10.00
	4.50m		4.70	10.00
	6.00m		1.50	10.00
	7.50m		1.70	10.00

GT -123

Foundation Type	Depth of foundation below E.G.L.	Foundation size	Safe bearing capacity (t/m2)	Settlement (mm)
Strip footing	1.50m	4.50m wide (L/B=2.0)	1.90	10.00
	3.00m		3.50	10.00
	4.50m		4.70	10.00
	6.00m		4.20	10.00
	7.50m		5.10	10.00

9.0 RECOMMENDATIONS

- Geotechnical Exploration for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor to be constructed was determined from soil exploration with ten boreholes.
- Deep foundation in the form of R.C.C. bored cast-in-situ piles and open foundation in the form of strip footings are suggested for the proposed structure. The capacities for such foundations shall be governed by the table given in section 7.
- The load carrying capacities of the piles shall be checked and confirmed by pile load test.
- The piles should be placed at a centre to centre spacing of three times the diameter of the pile.
- Suitable pile cap shall be provided for the piles in a group.
- Precaution in all respect should be taken for nearby existing structures, if any.
- The final decision regarding the foundation will depend on the judgment of the engineer concerned.

GEOTECHNICAL CONSULTANT

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 01

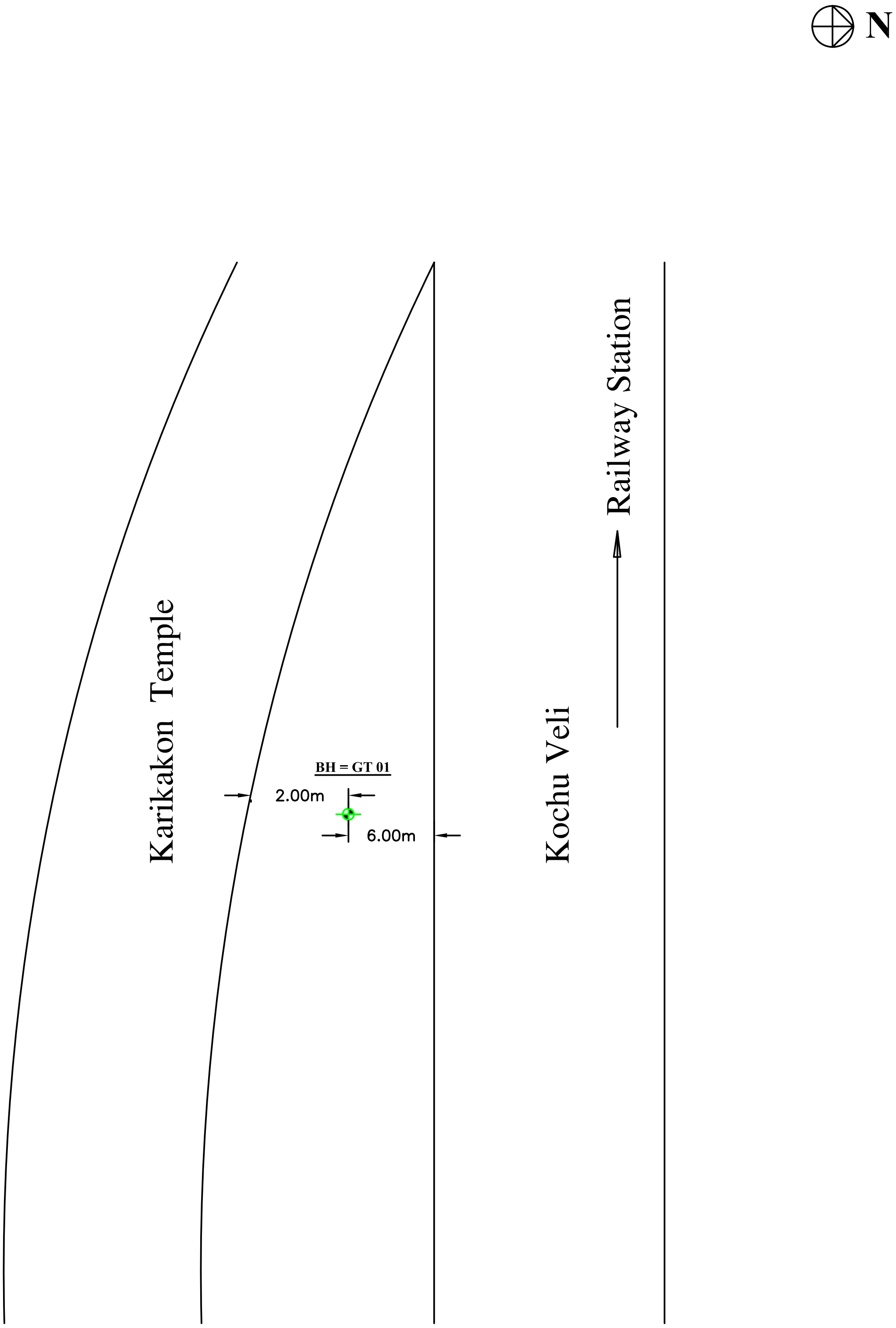


Figure1: Borehole Location Plane

Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 02

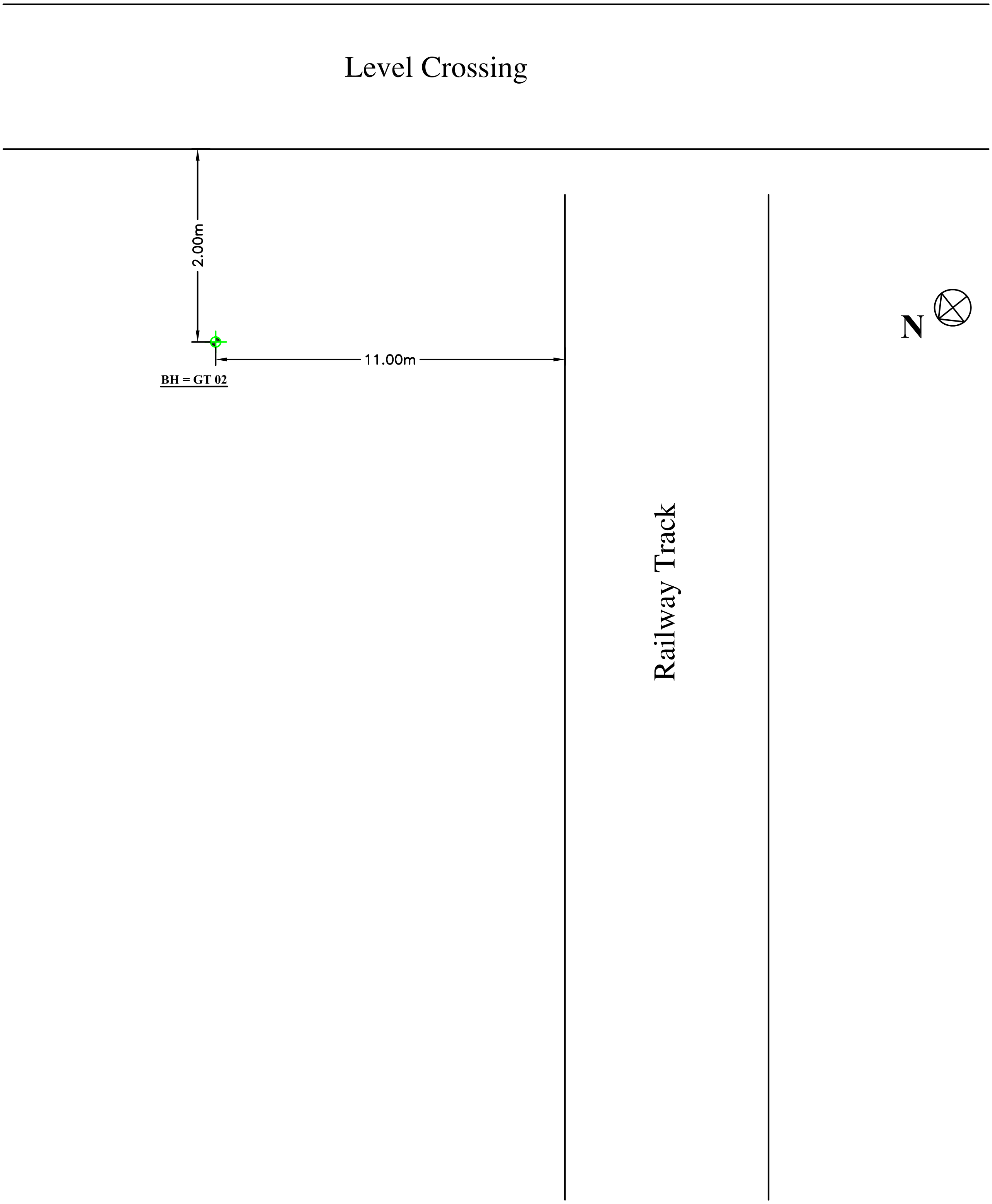


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 04

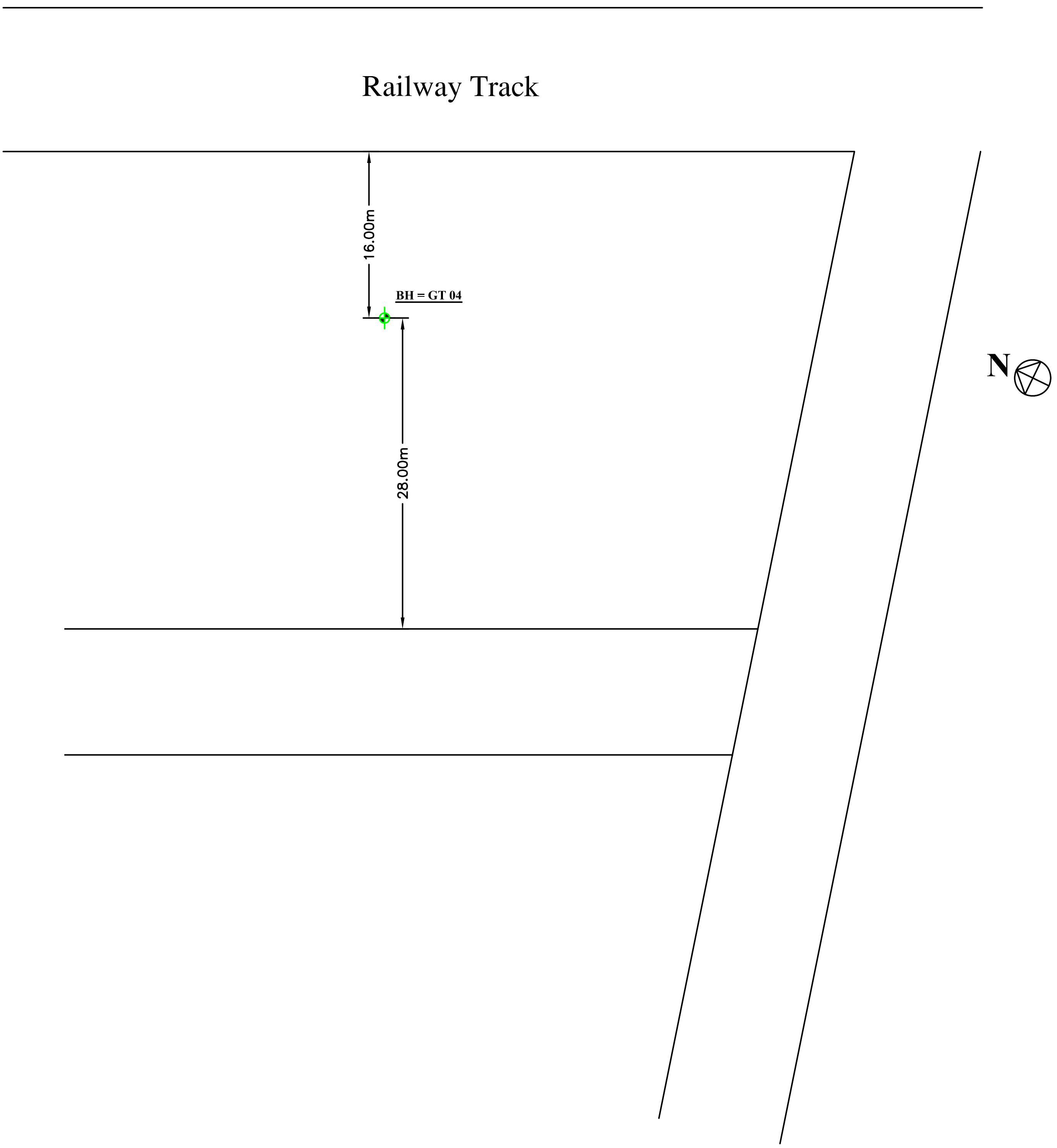


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 05

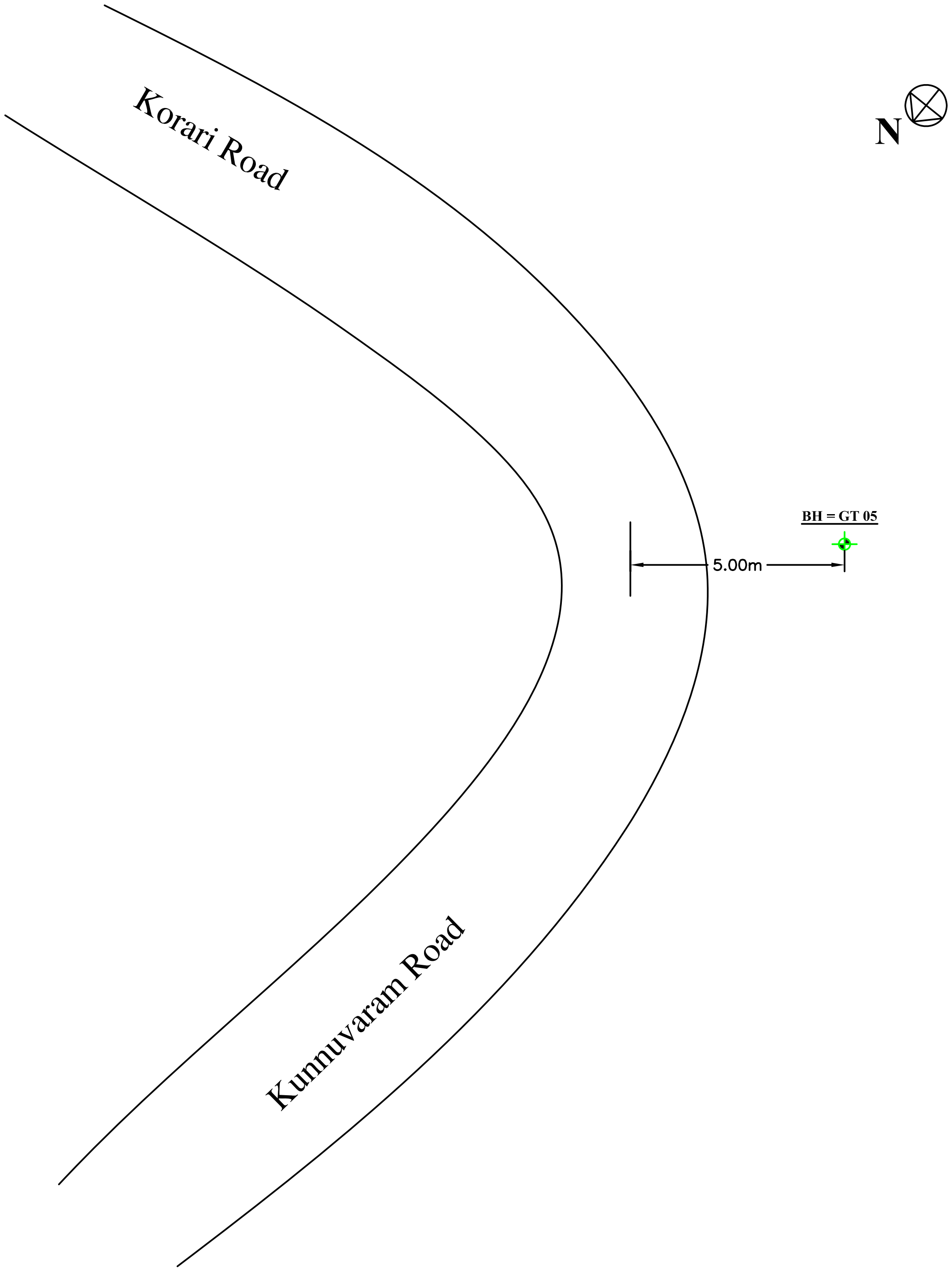


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 06

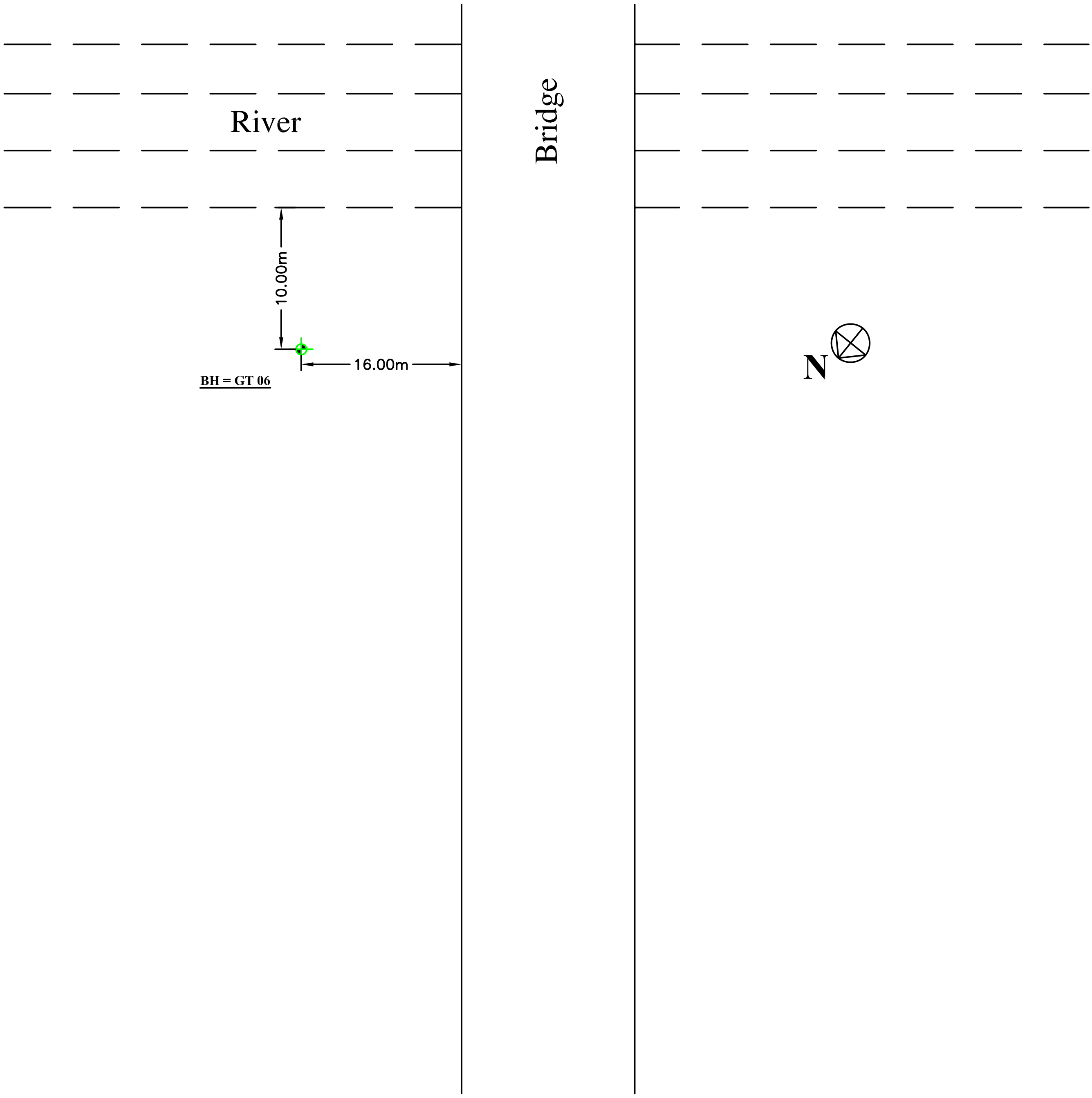


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 07

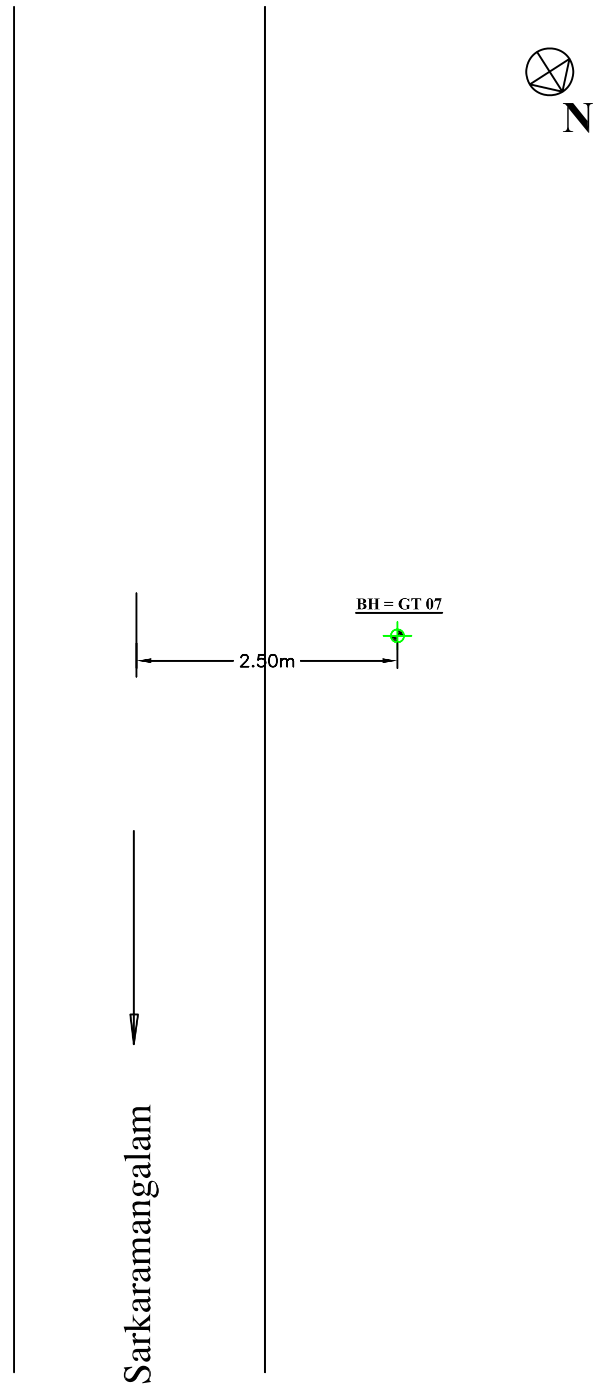


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 08

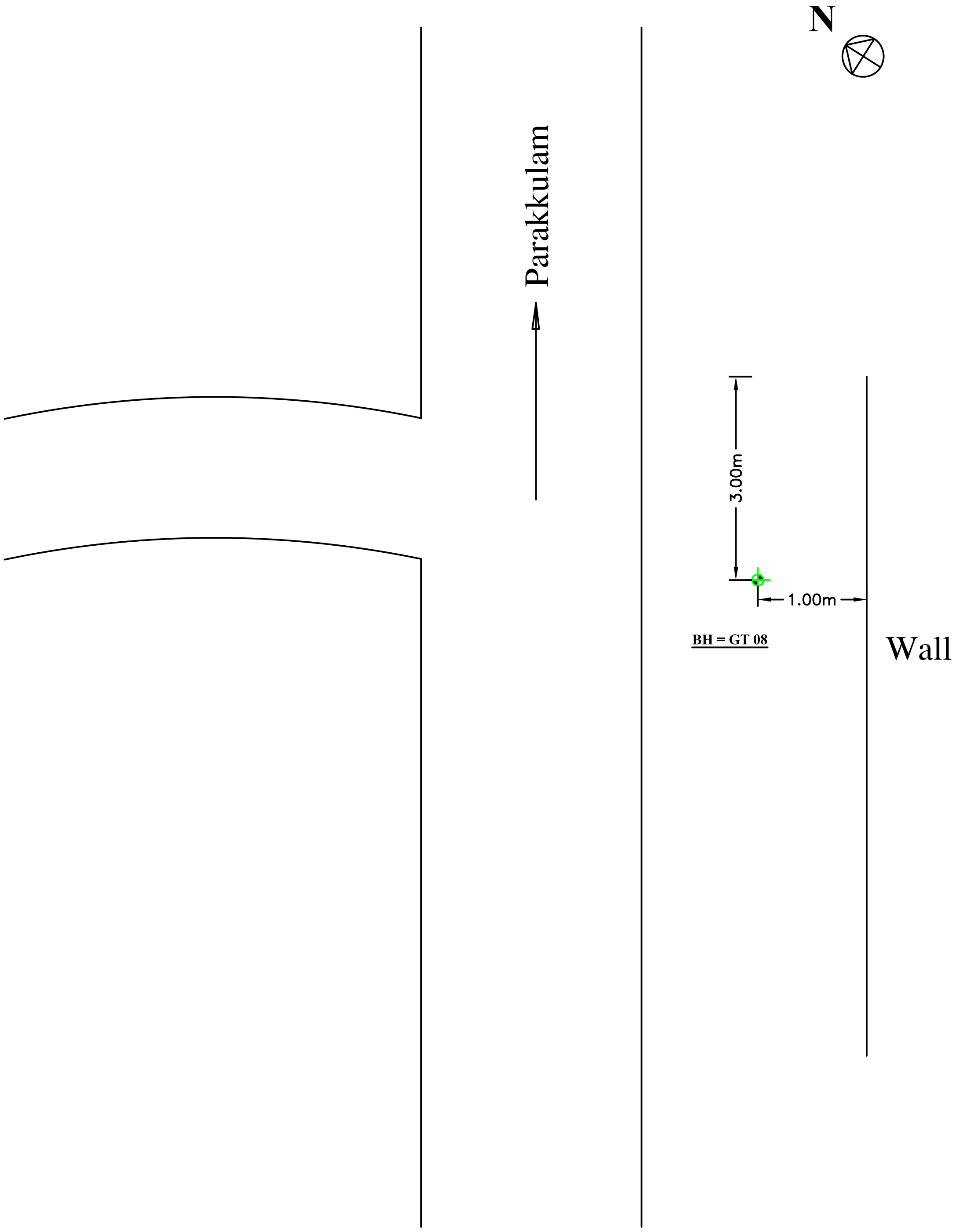


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 09

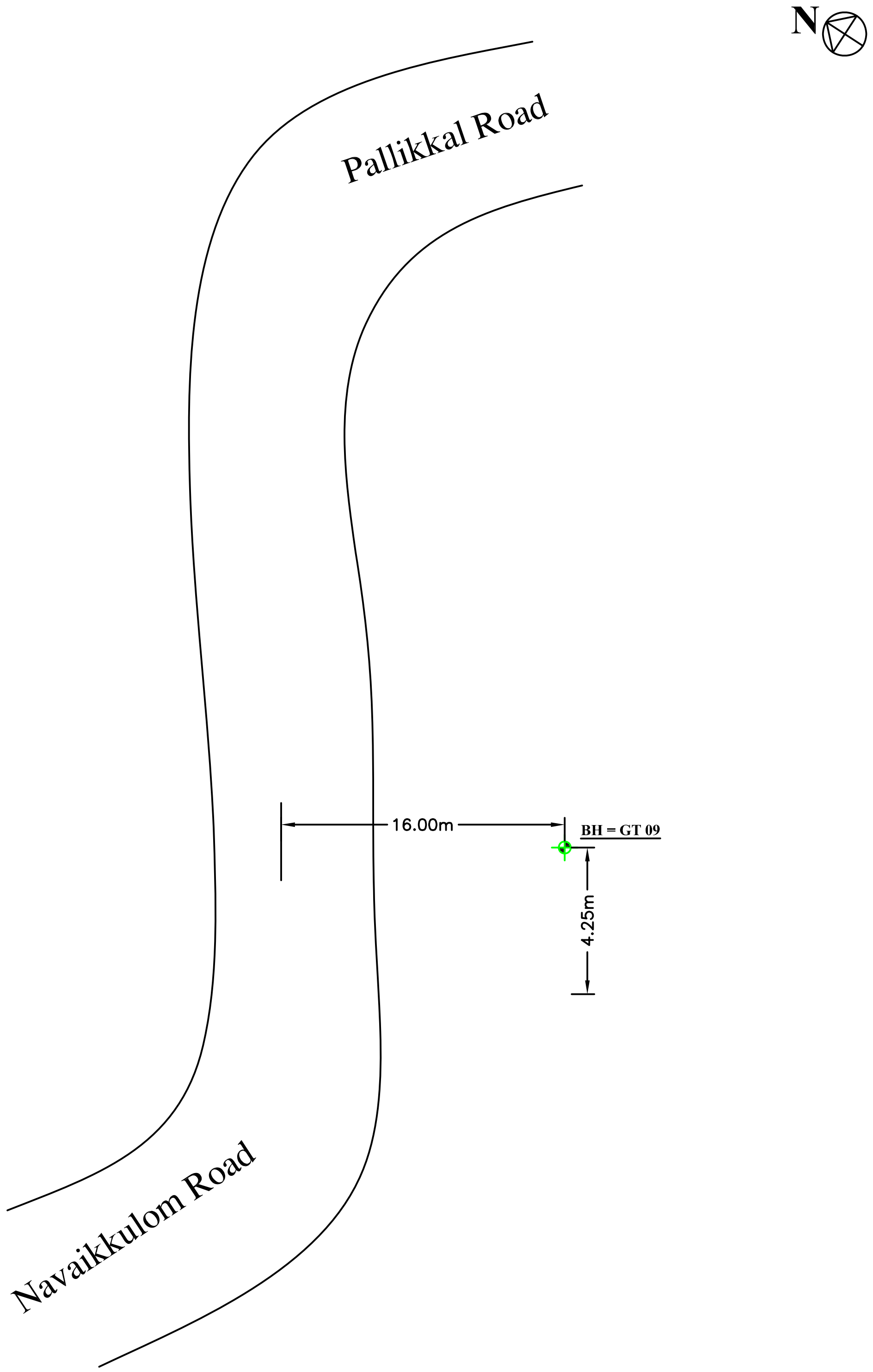


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 10

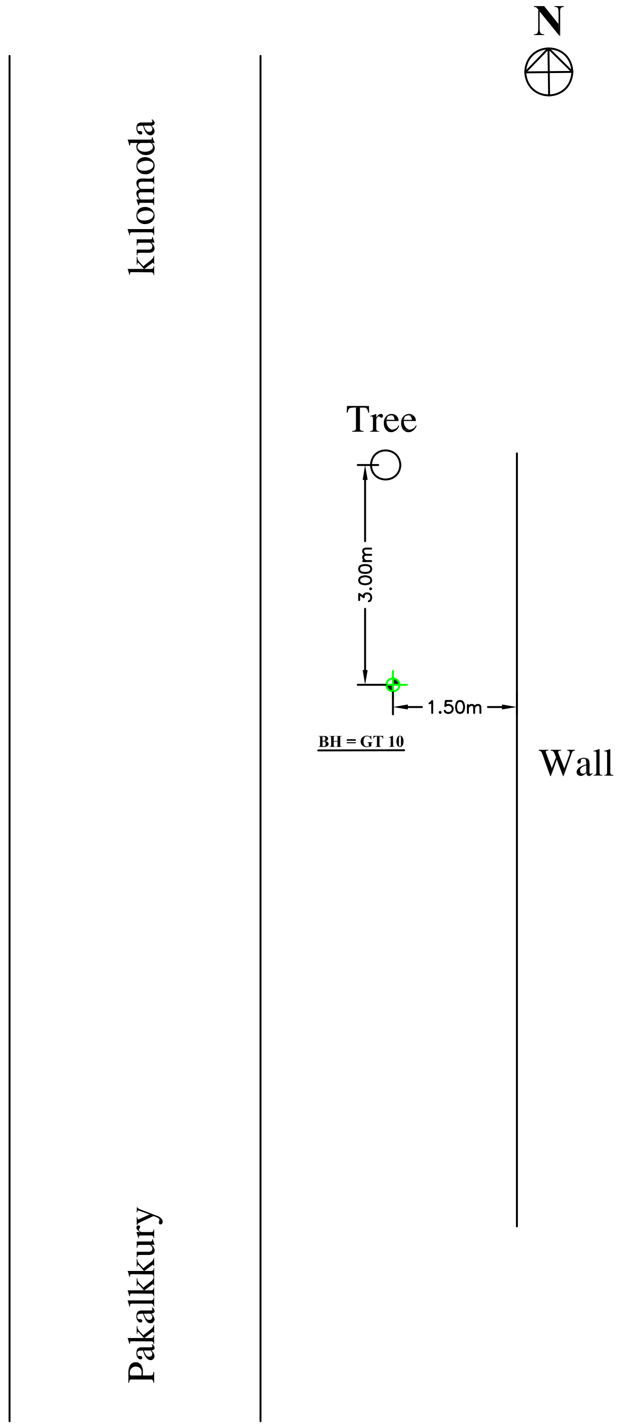


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 11

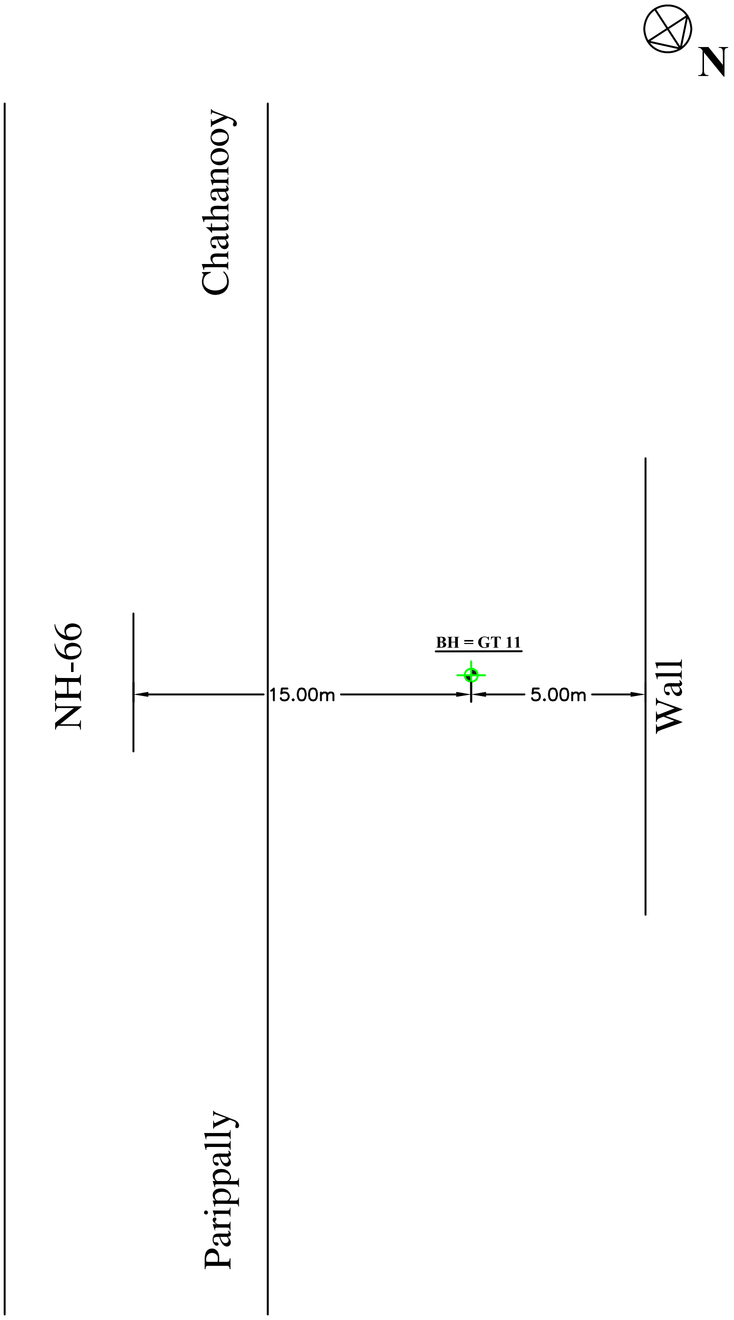


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 12

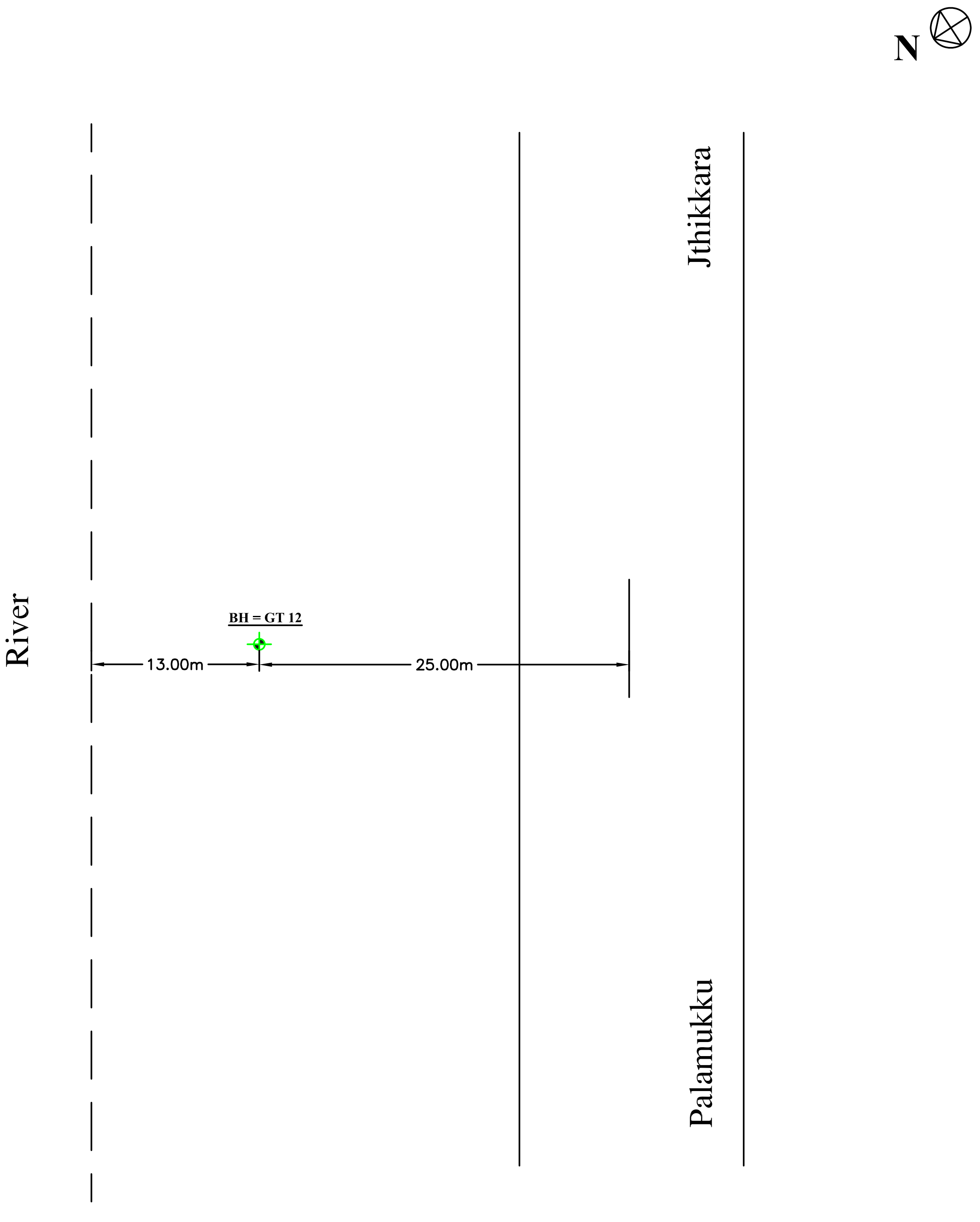


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 13

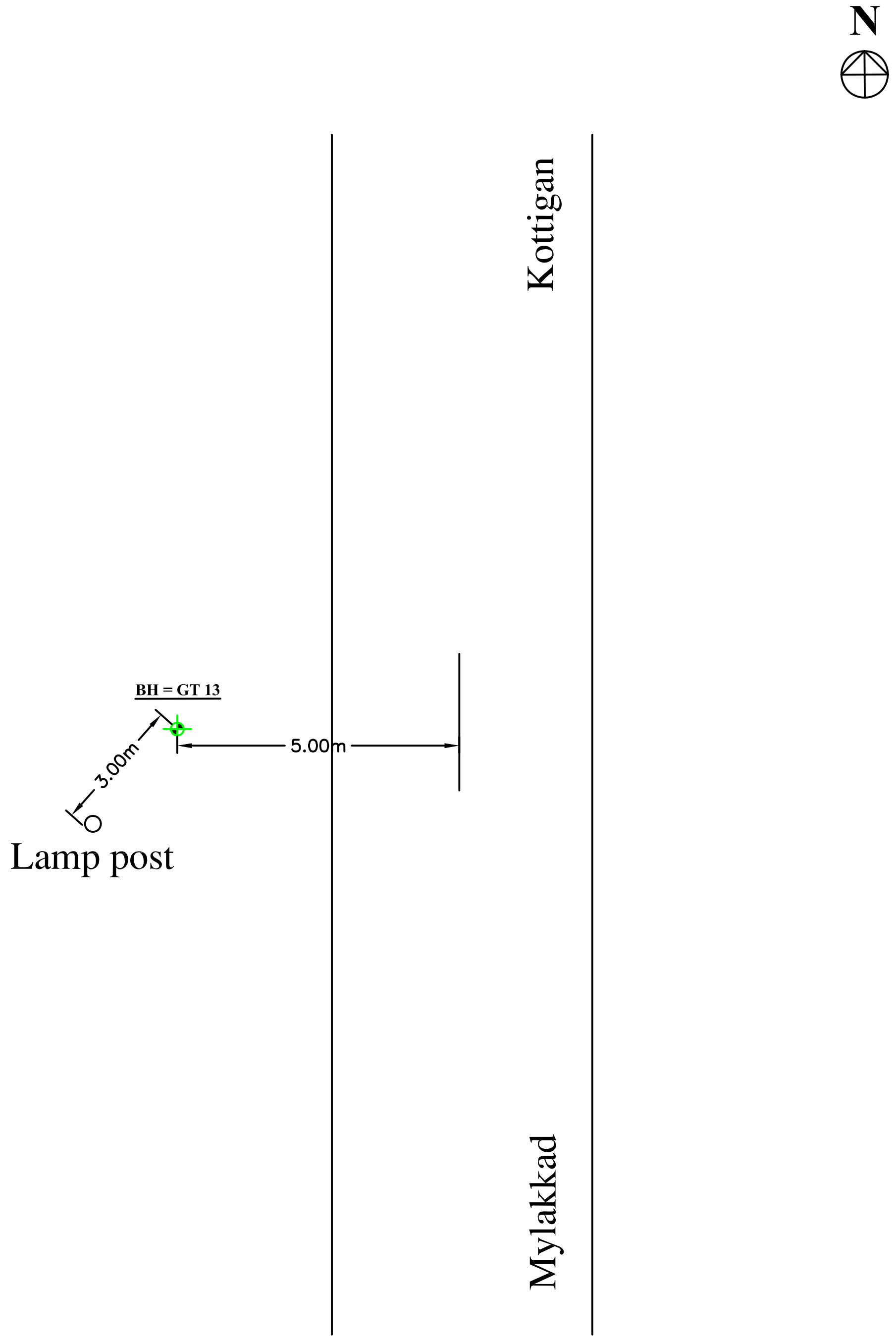


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 14

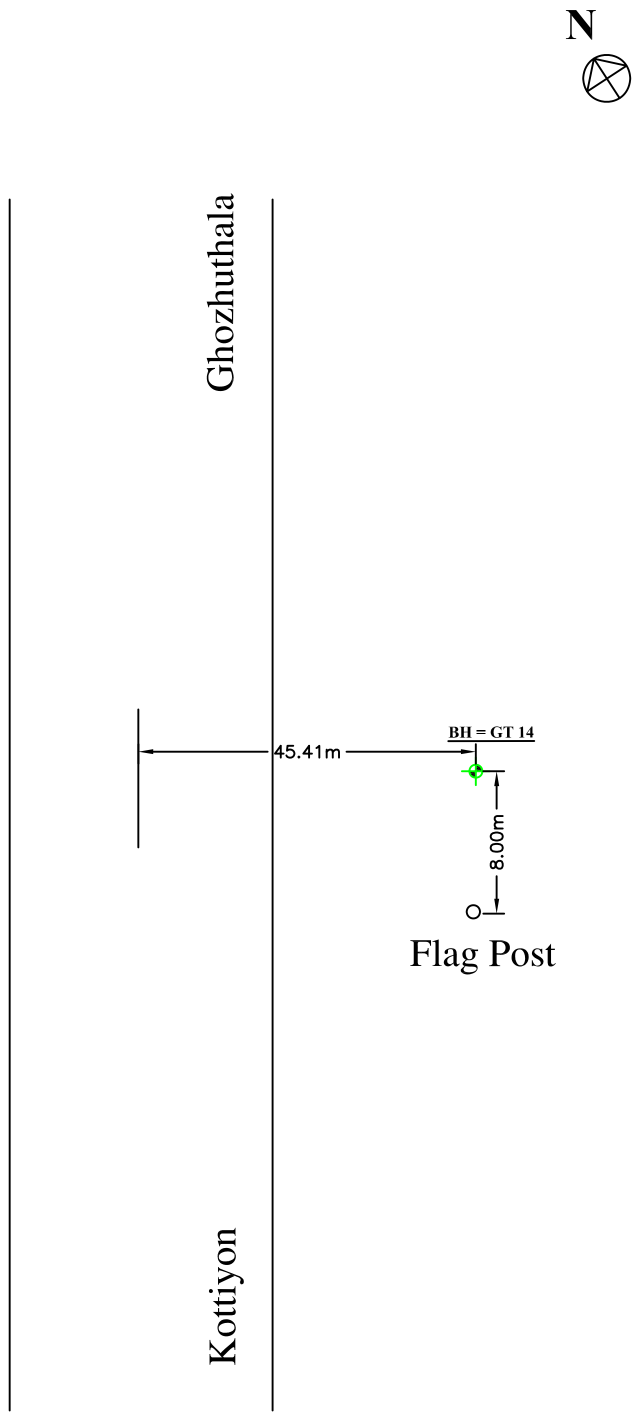


Figure1: Borehole Location Plane
Not to Scale

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 15

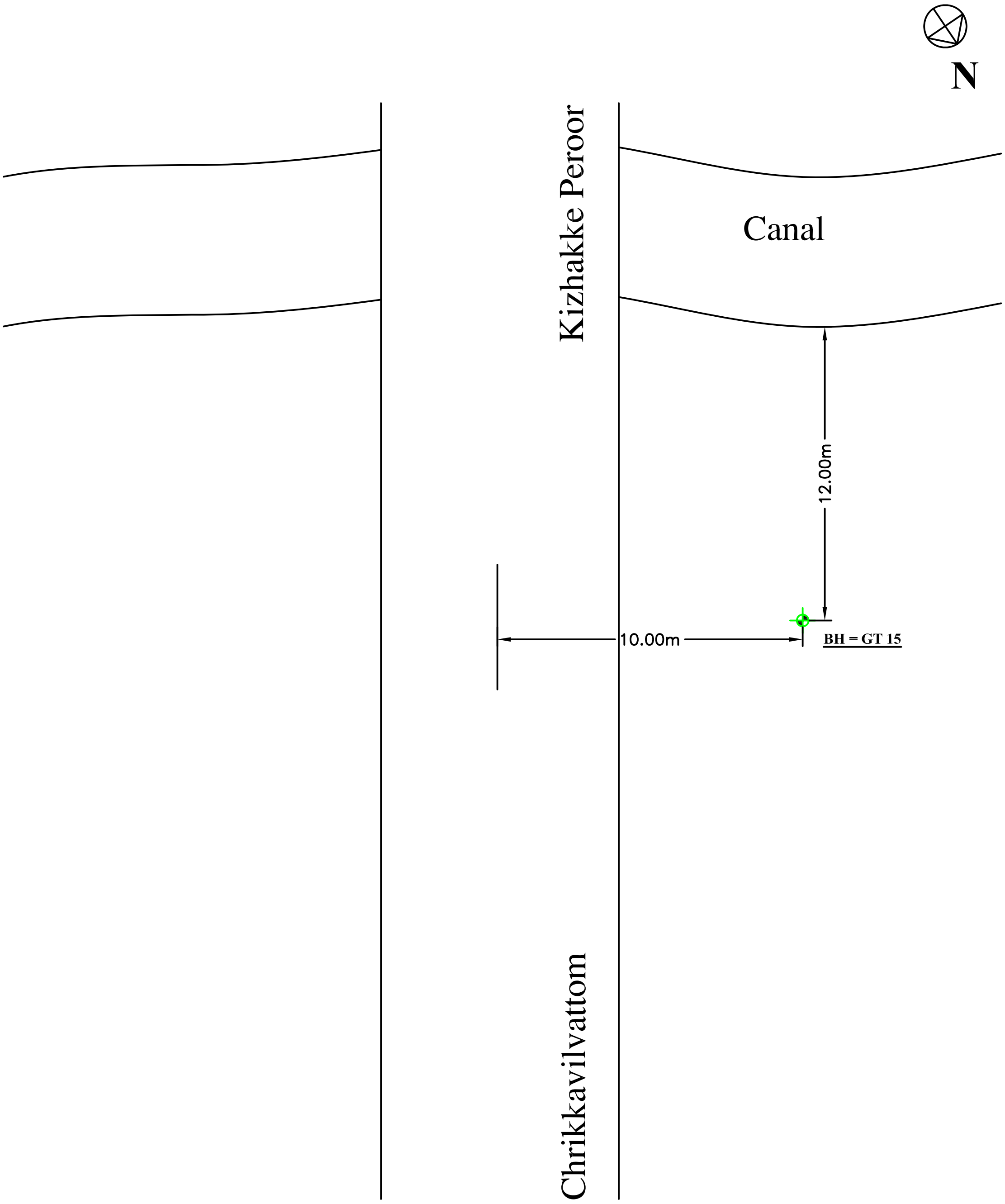


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 16

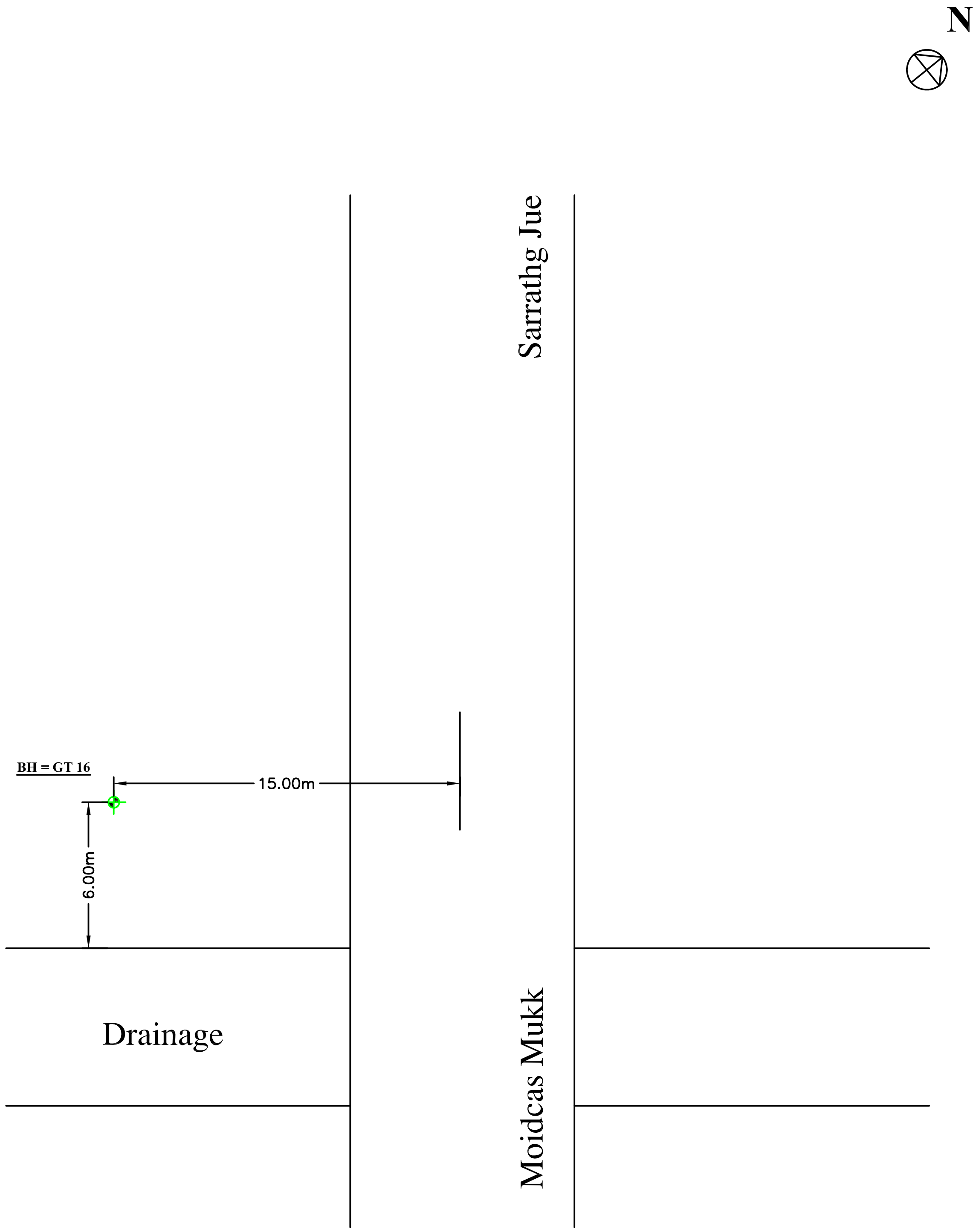


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 17

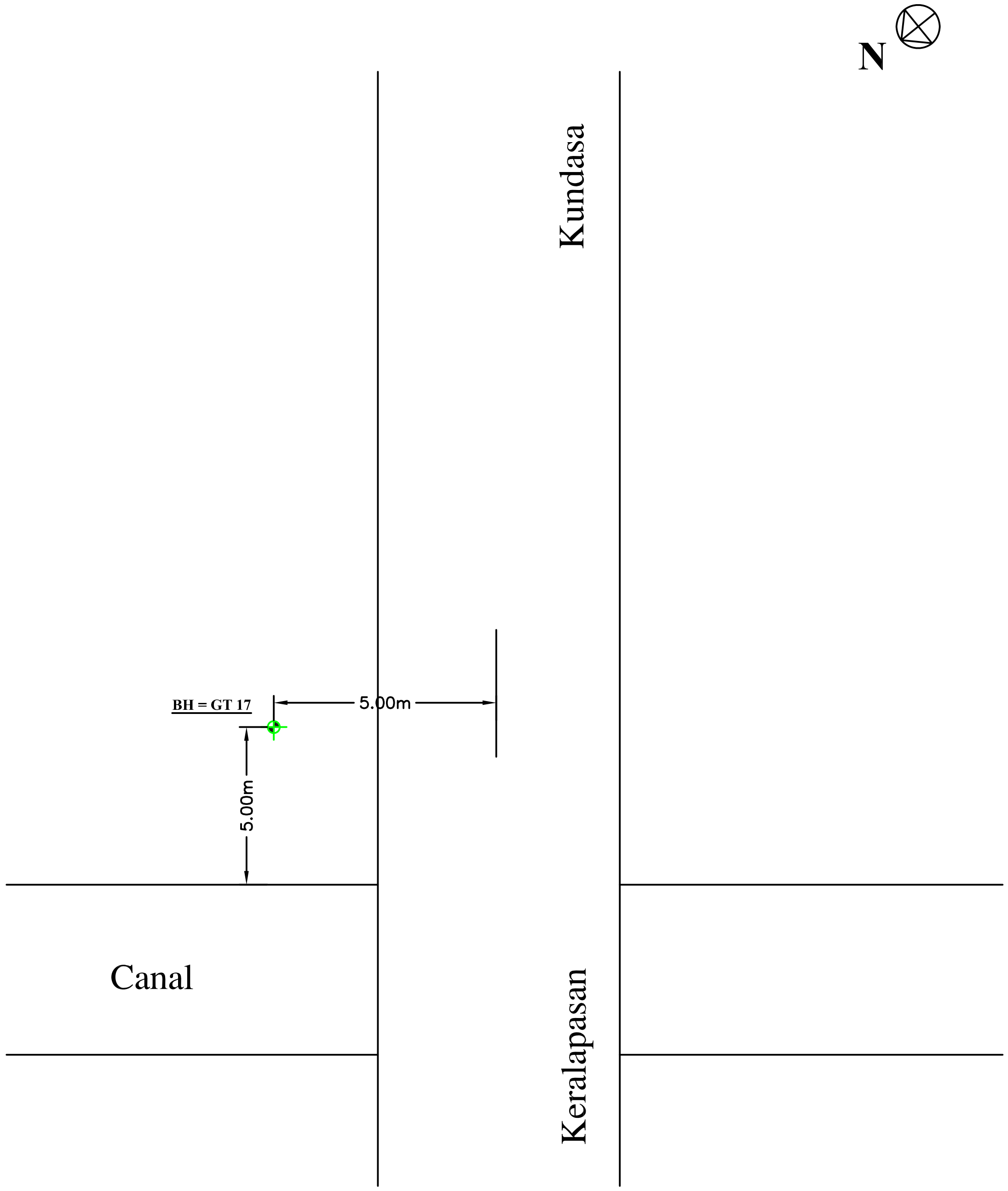


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 18

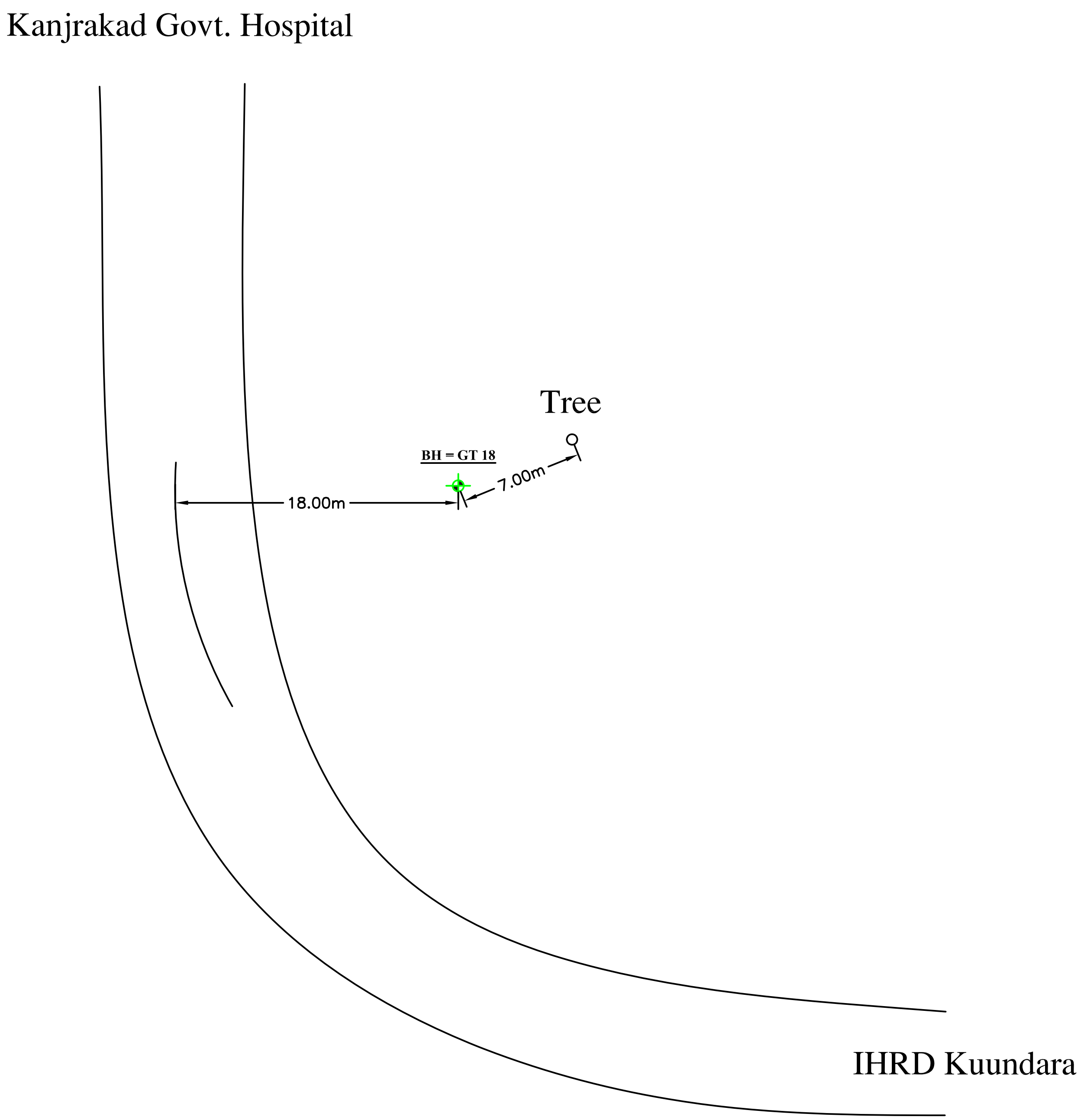


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 19

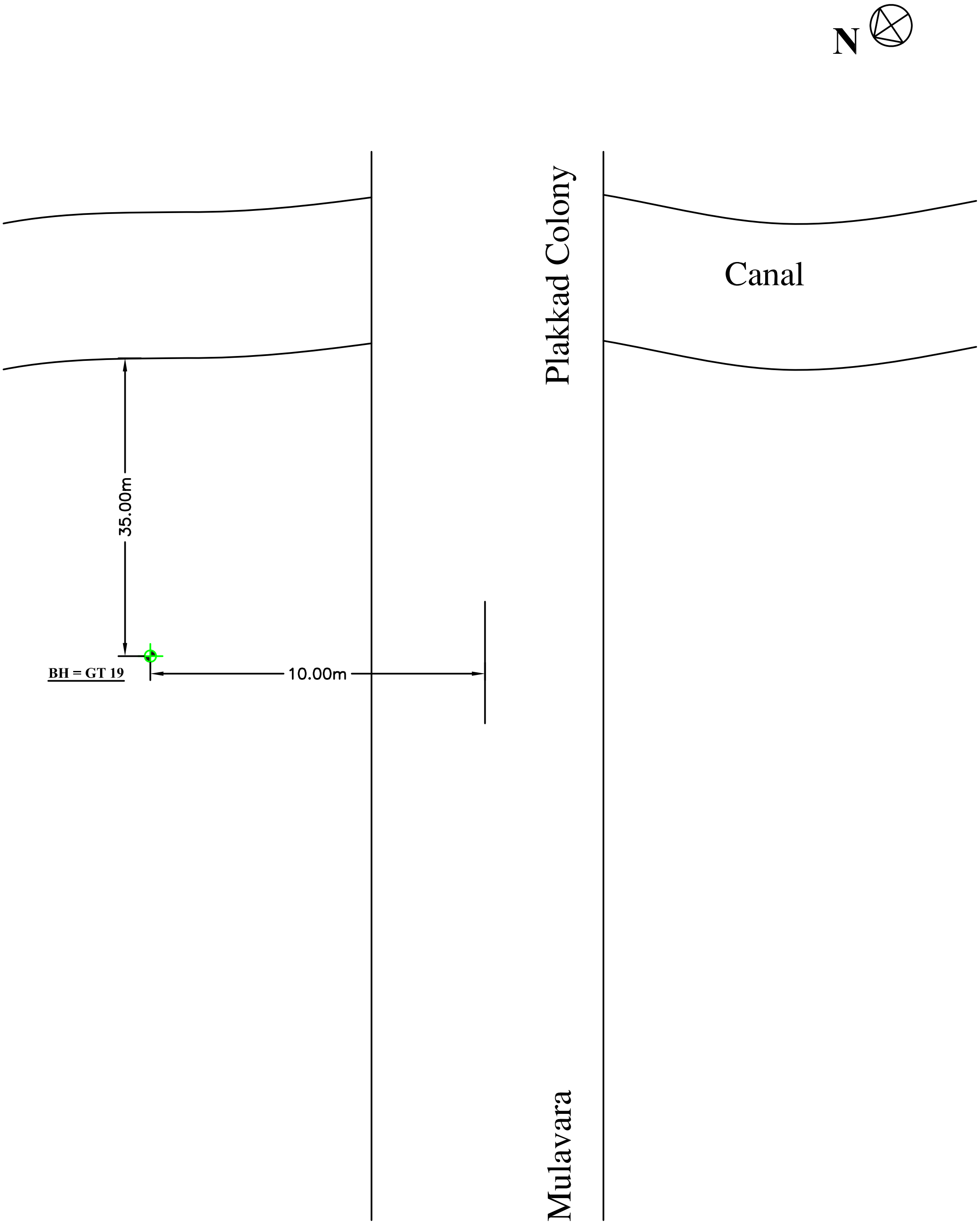


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 20

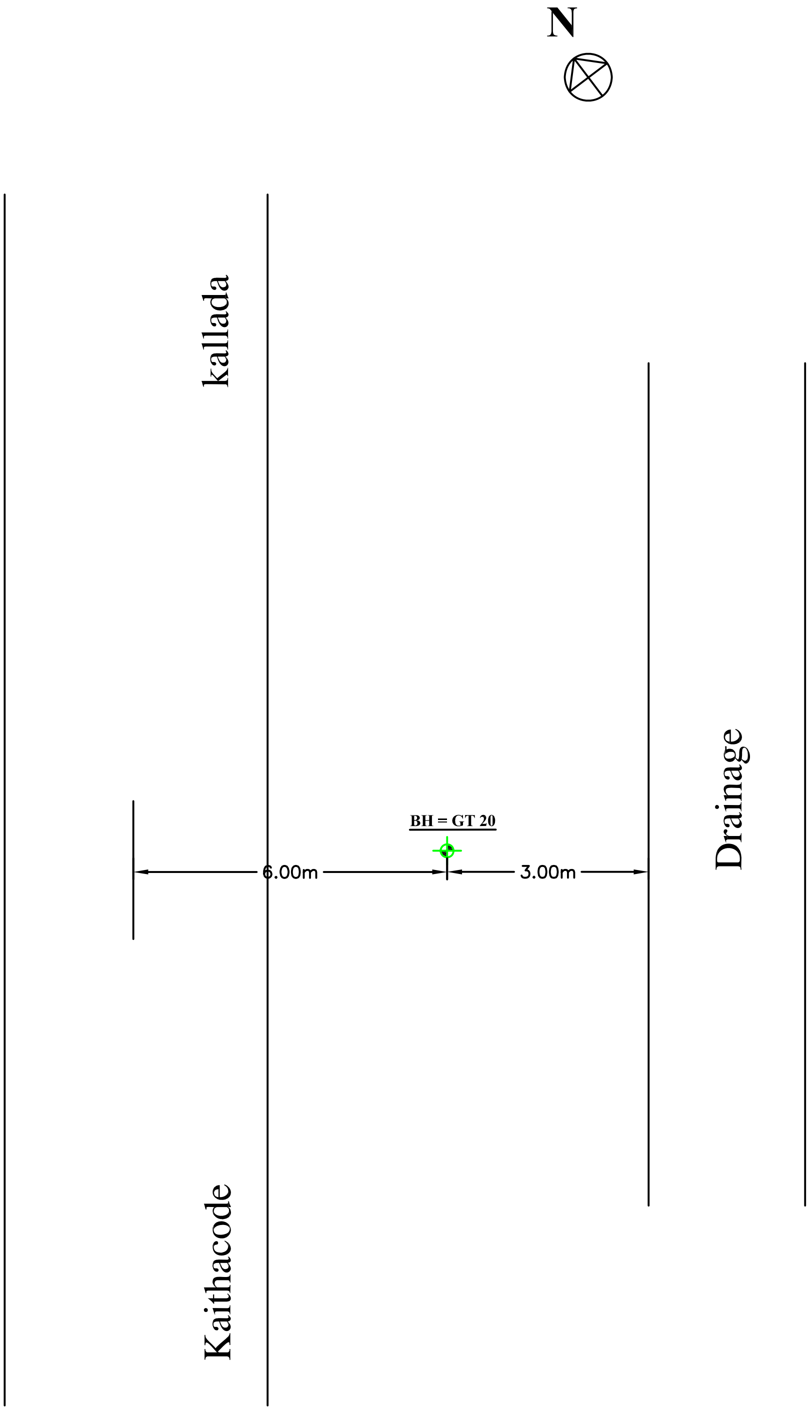


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 21

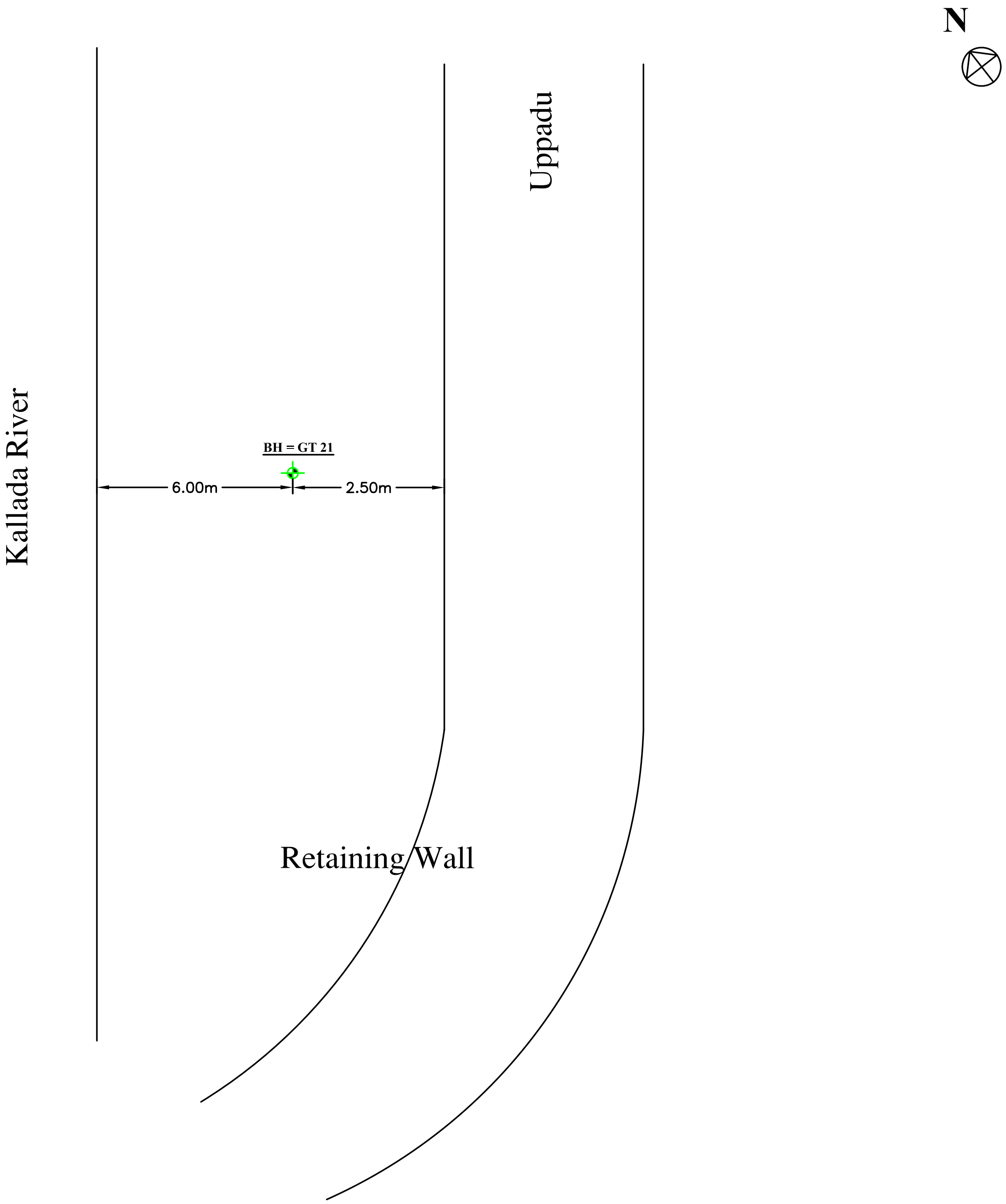


Figure1: Borehole Location Plane
Not to Scale

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 22

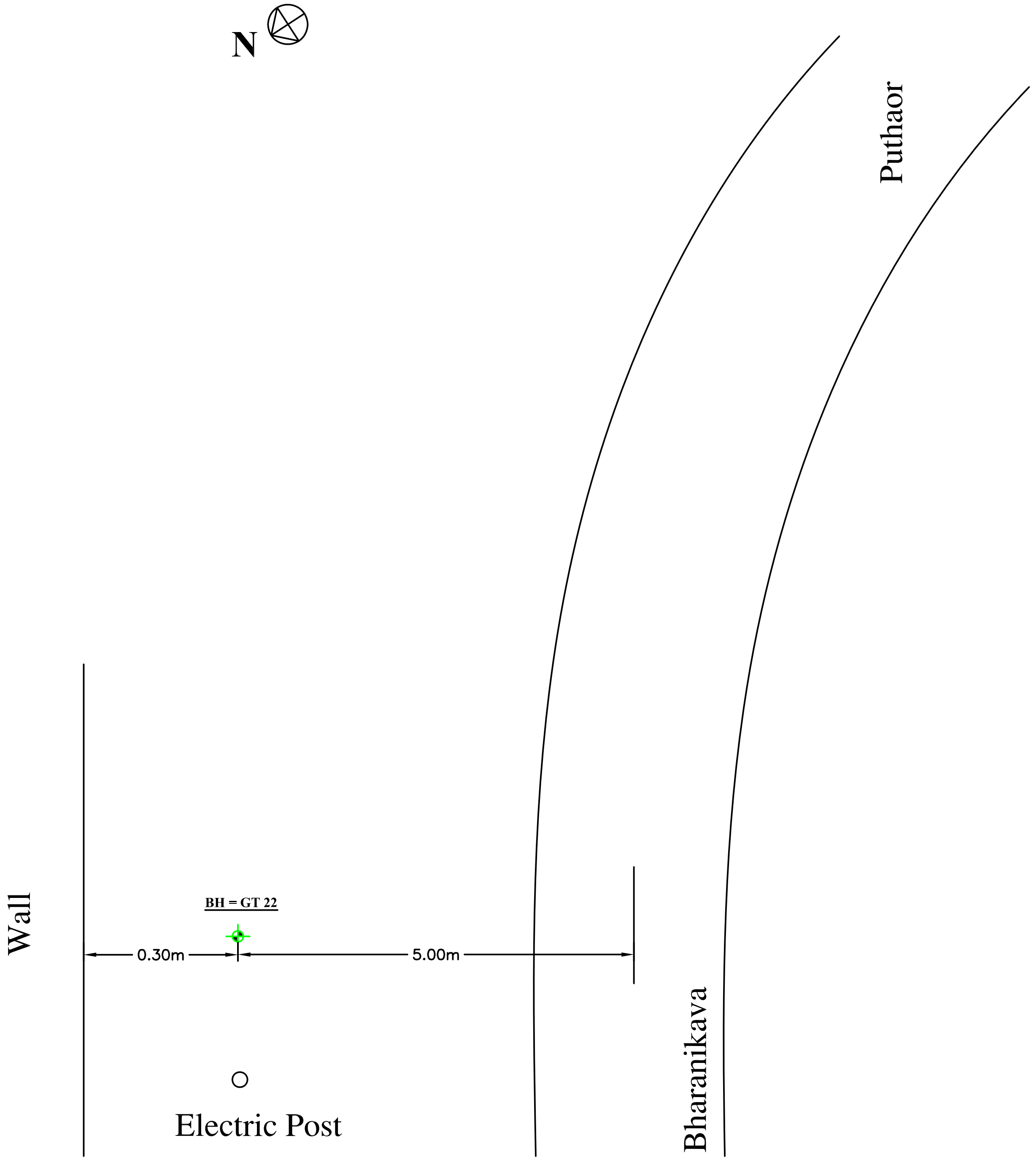


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 23

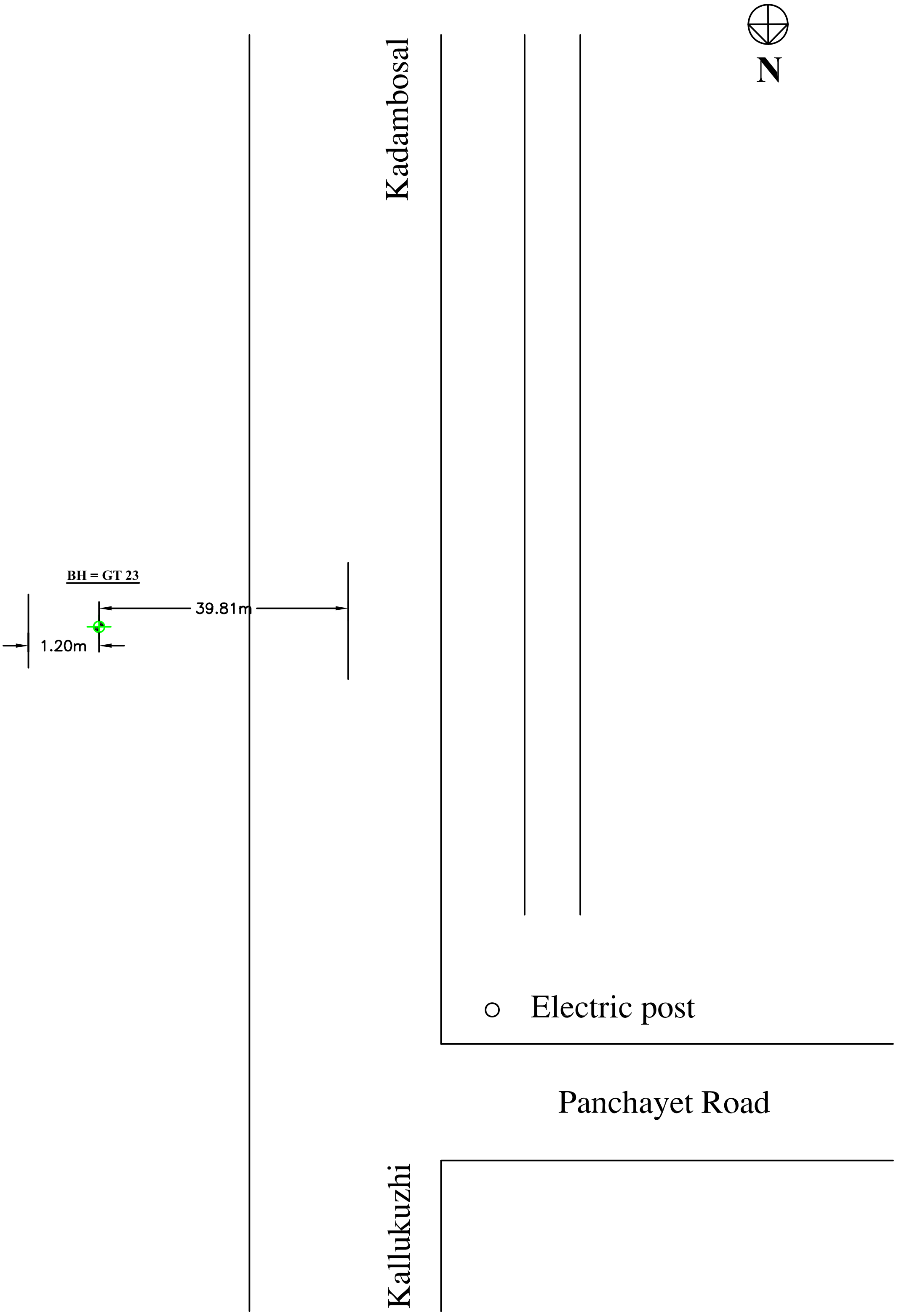


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 24

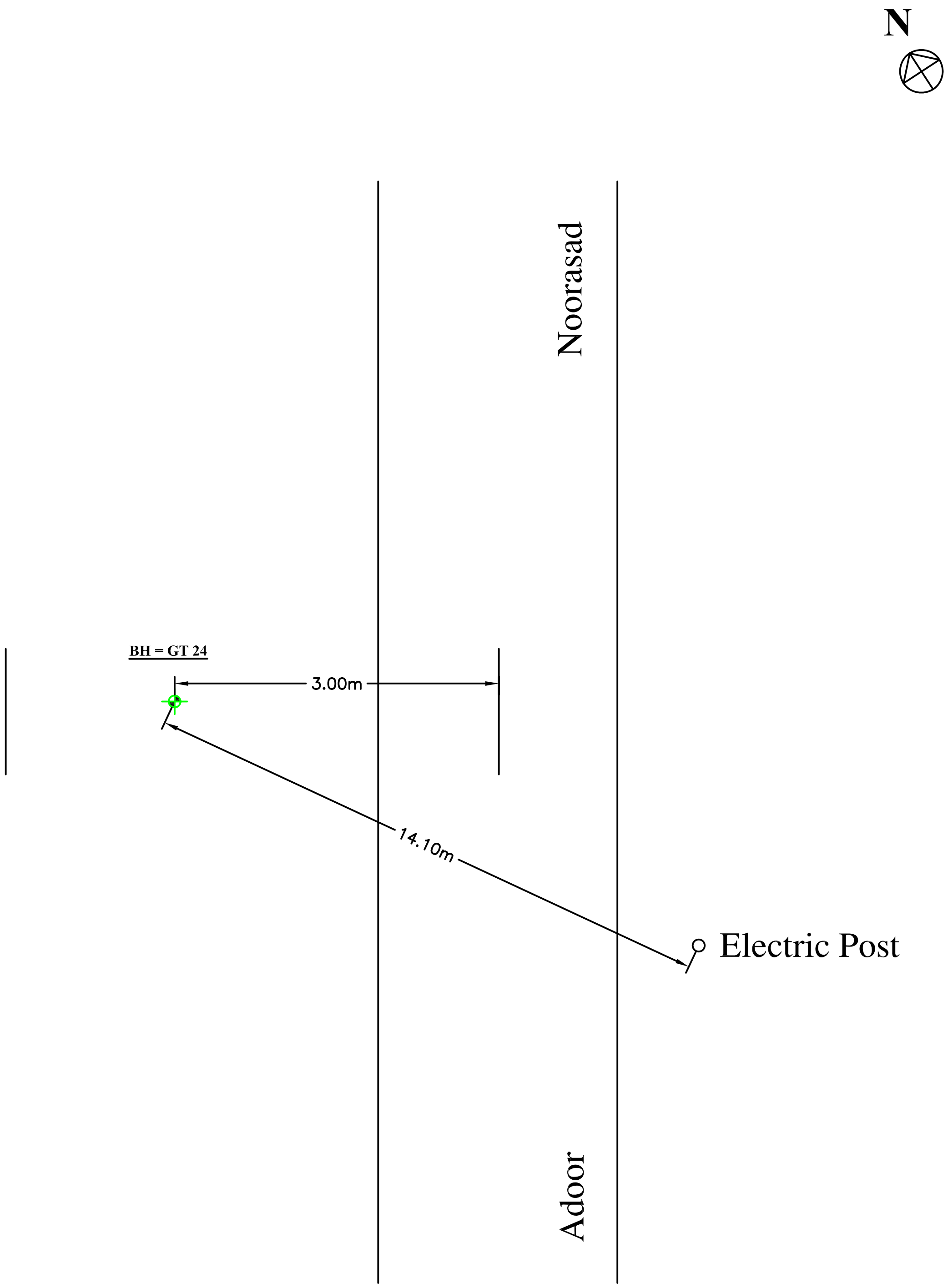


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 25

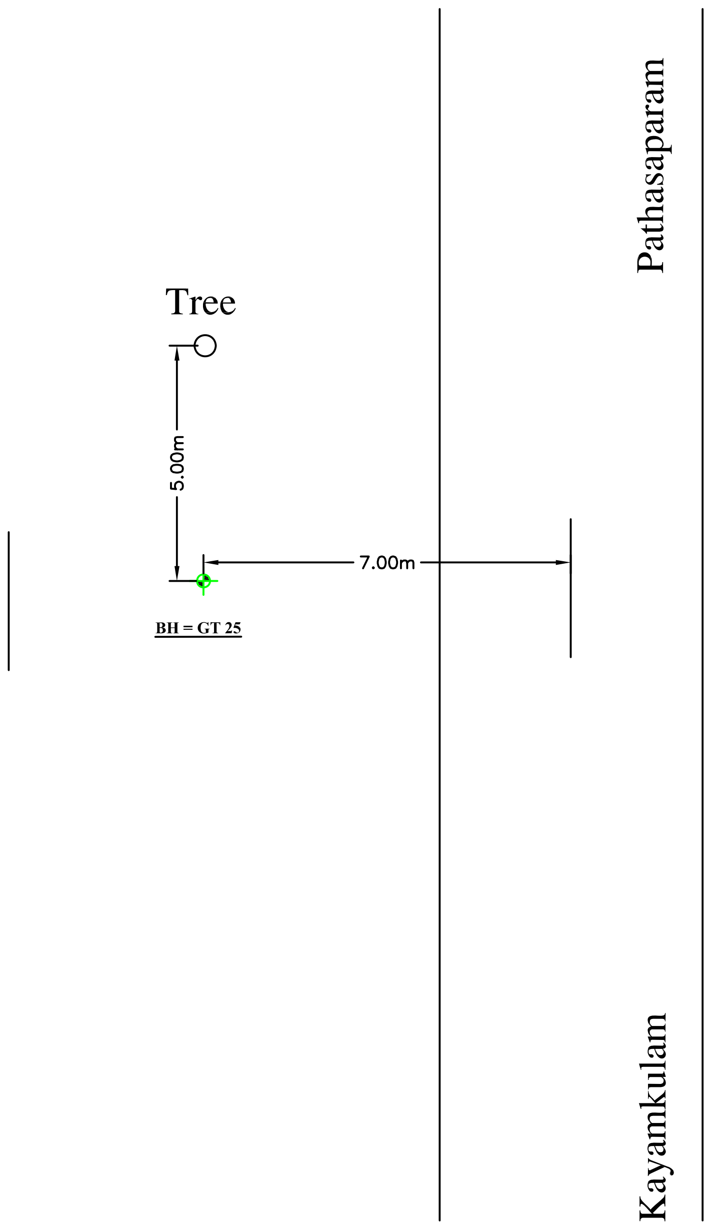


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 26

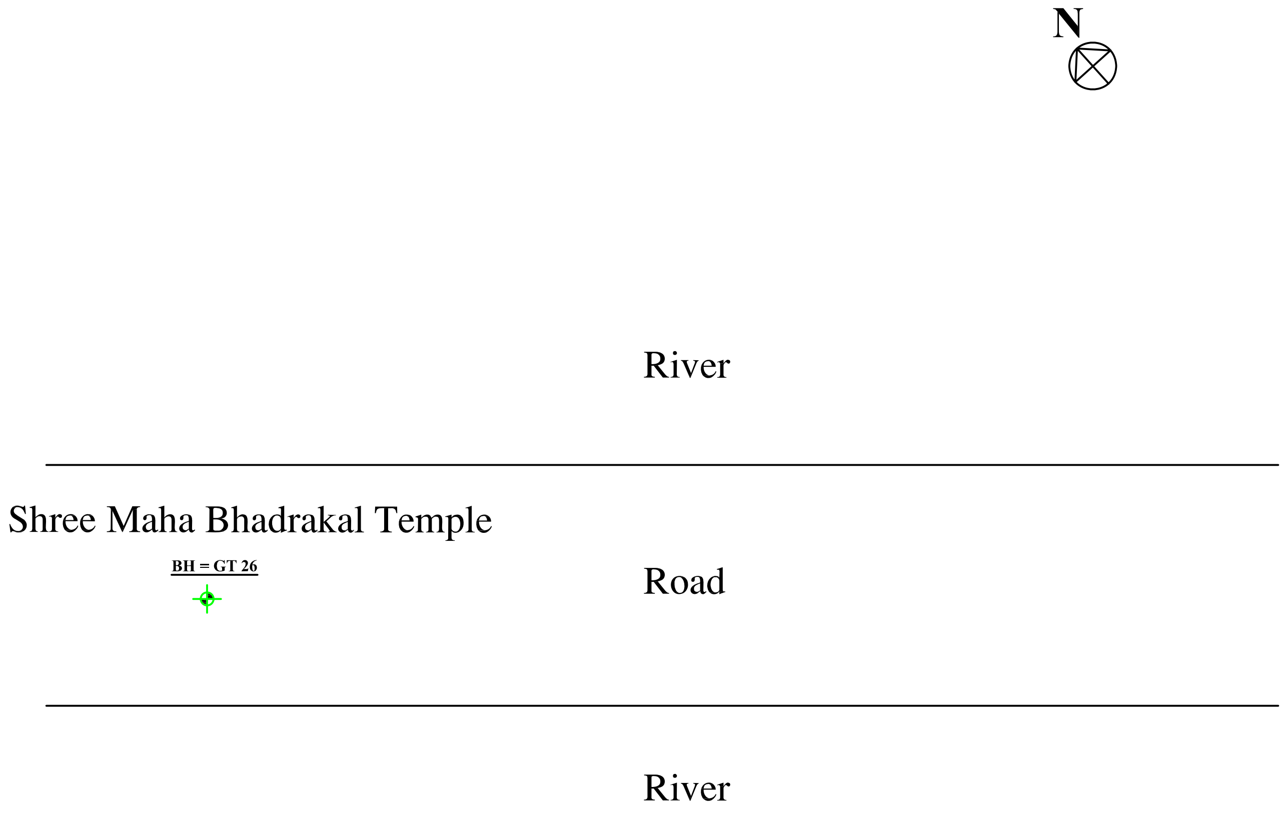


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 27

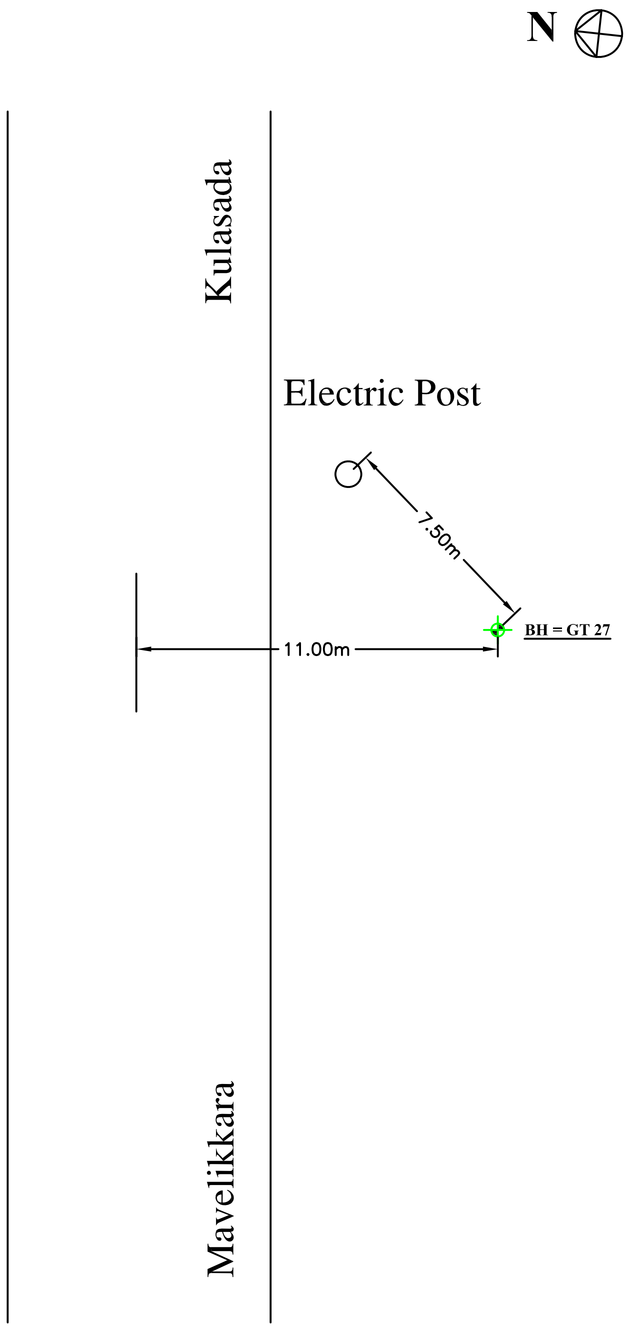


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 28

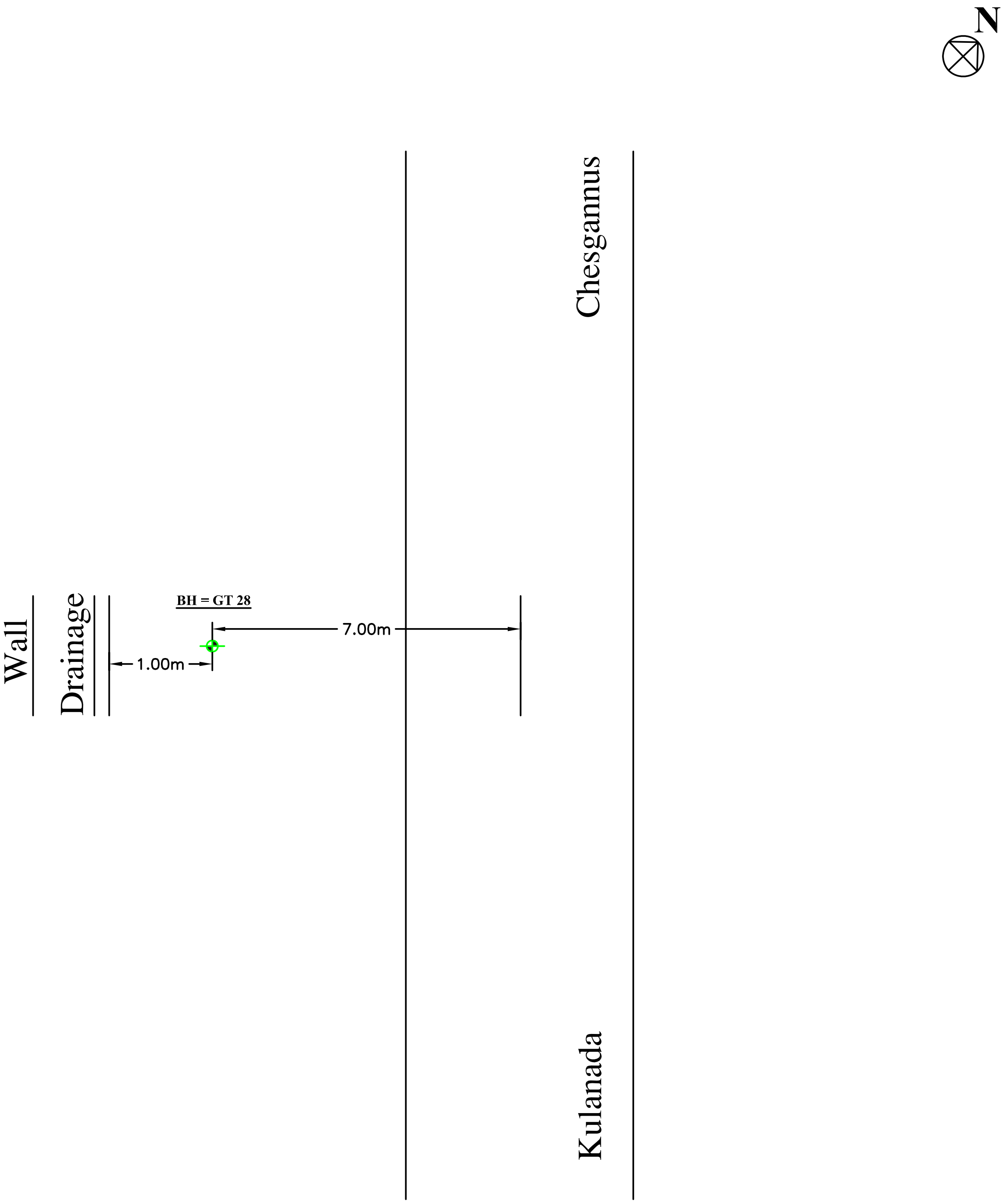


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 29

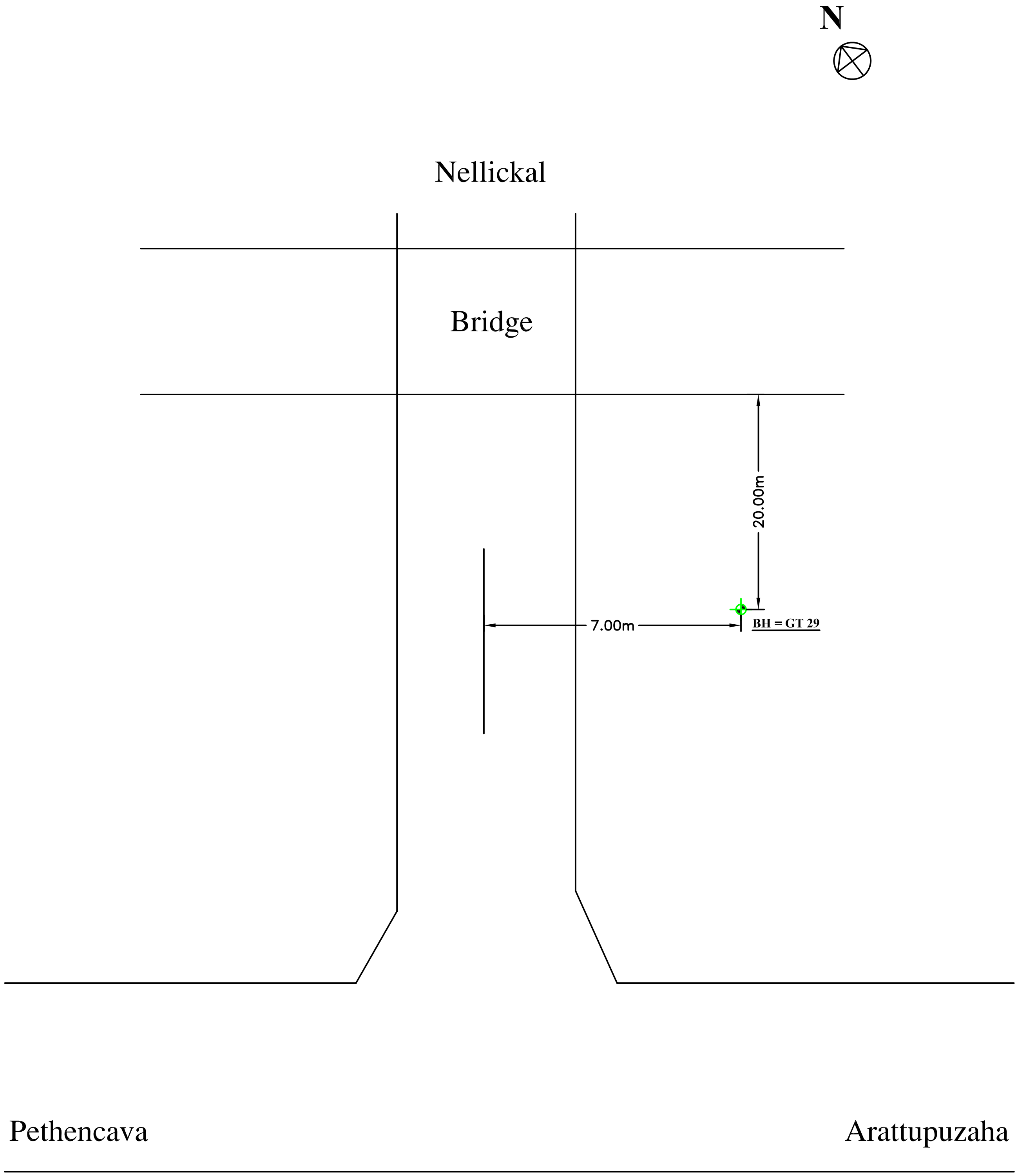


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 30

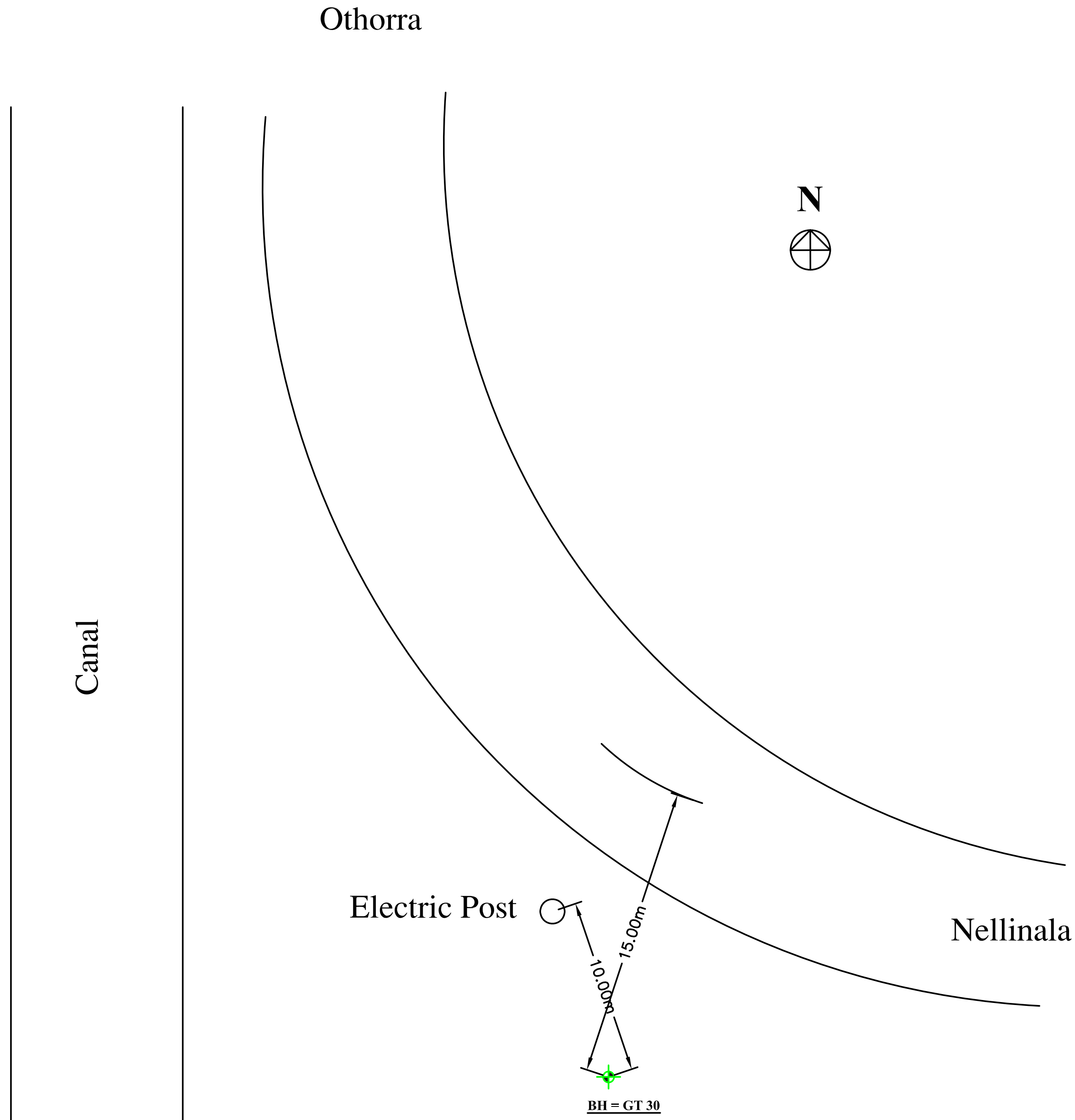


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 31

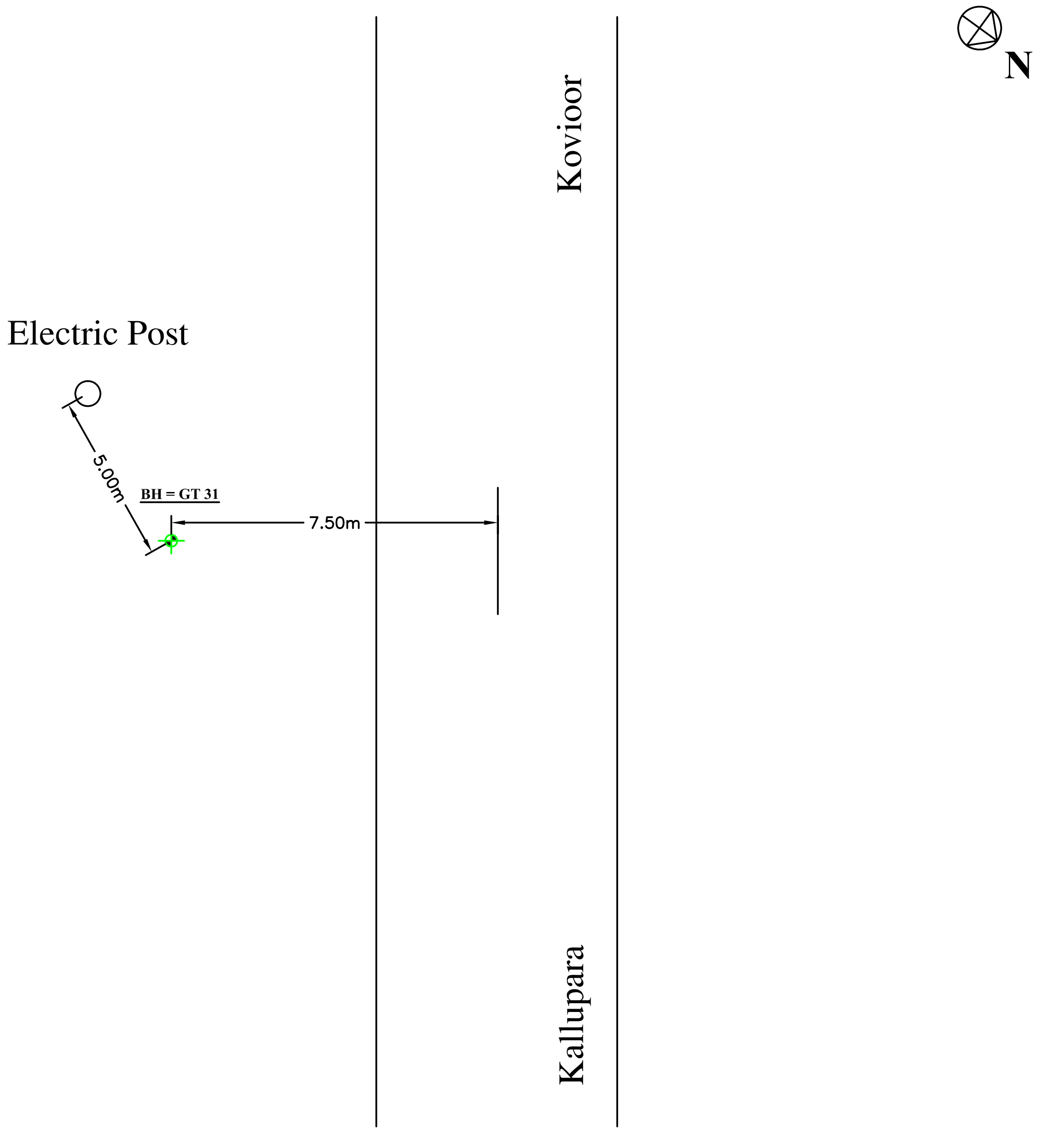


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 32

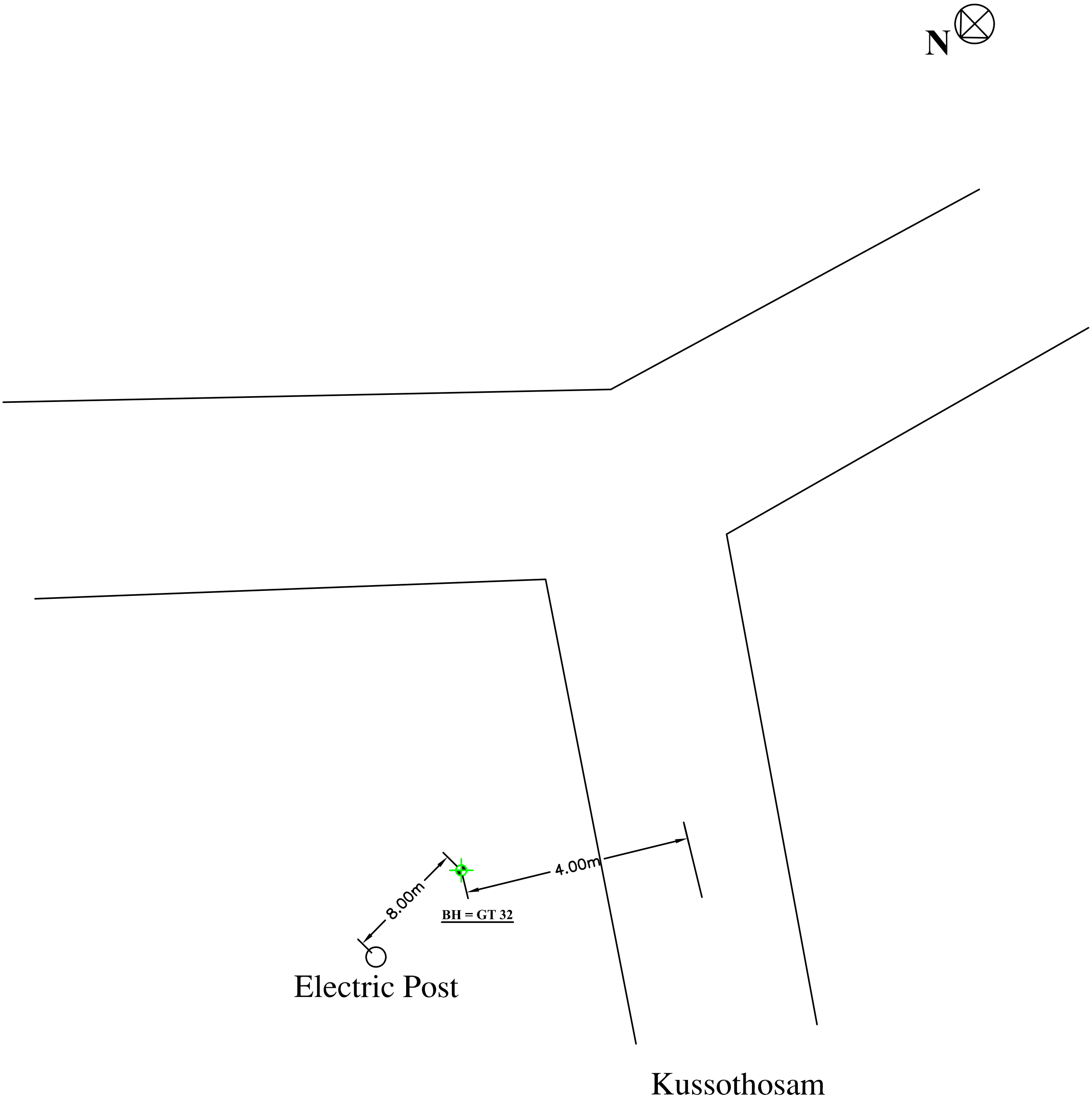


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 33

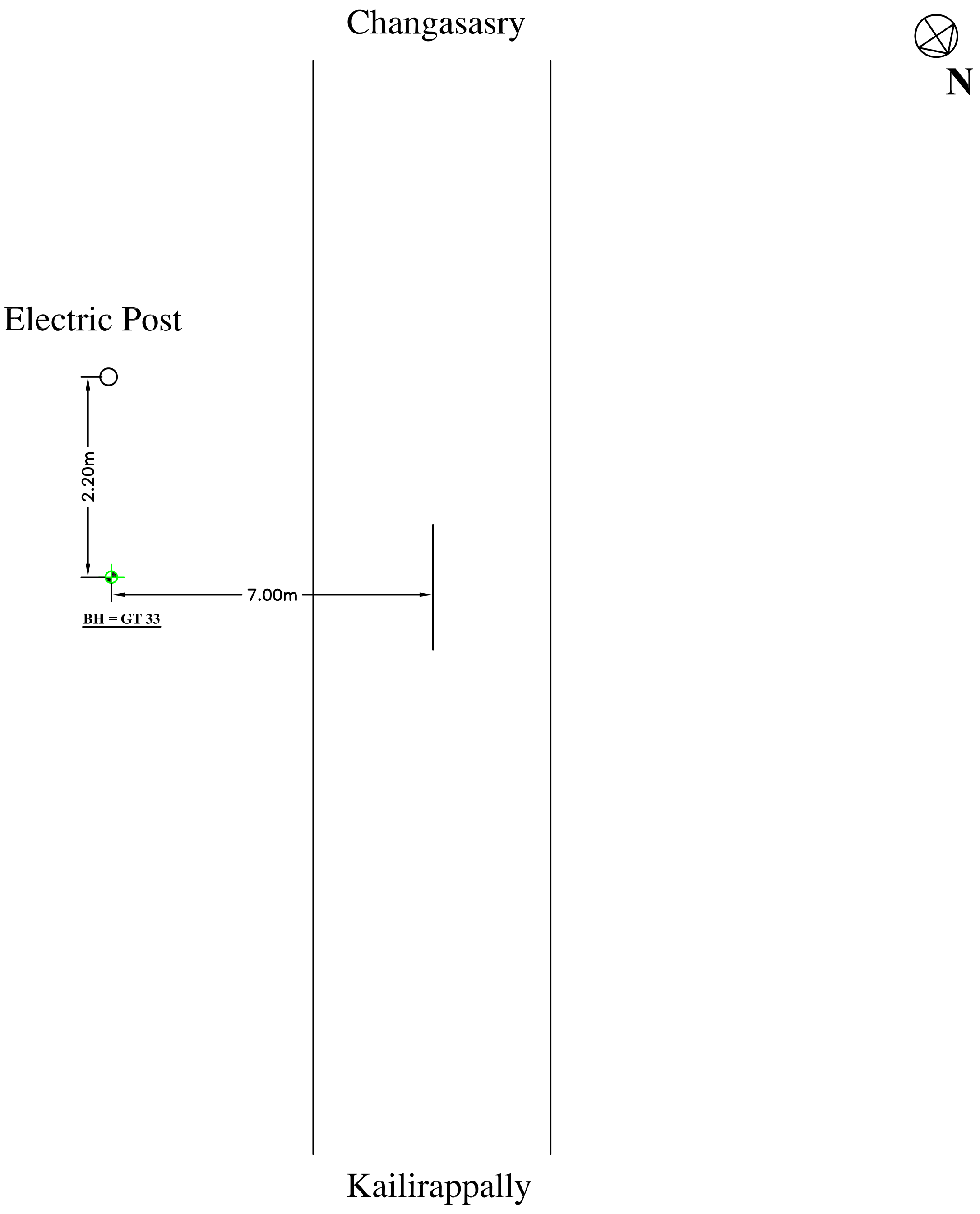


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 34

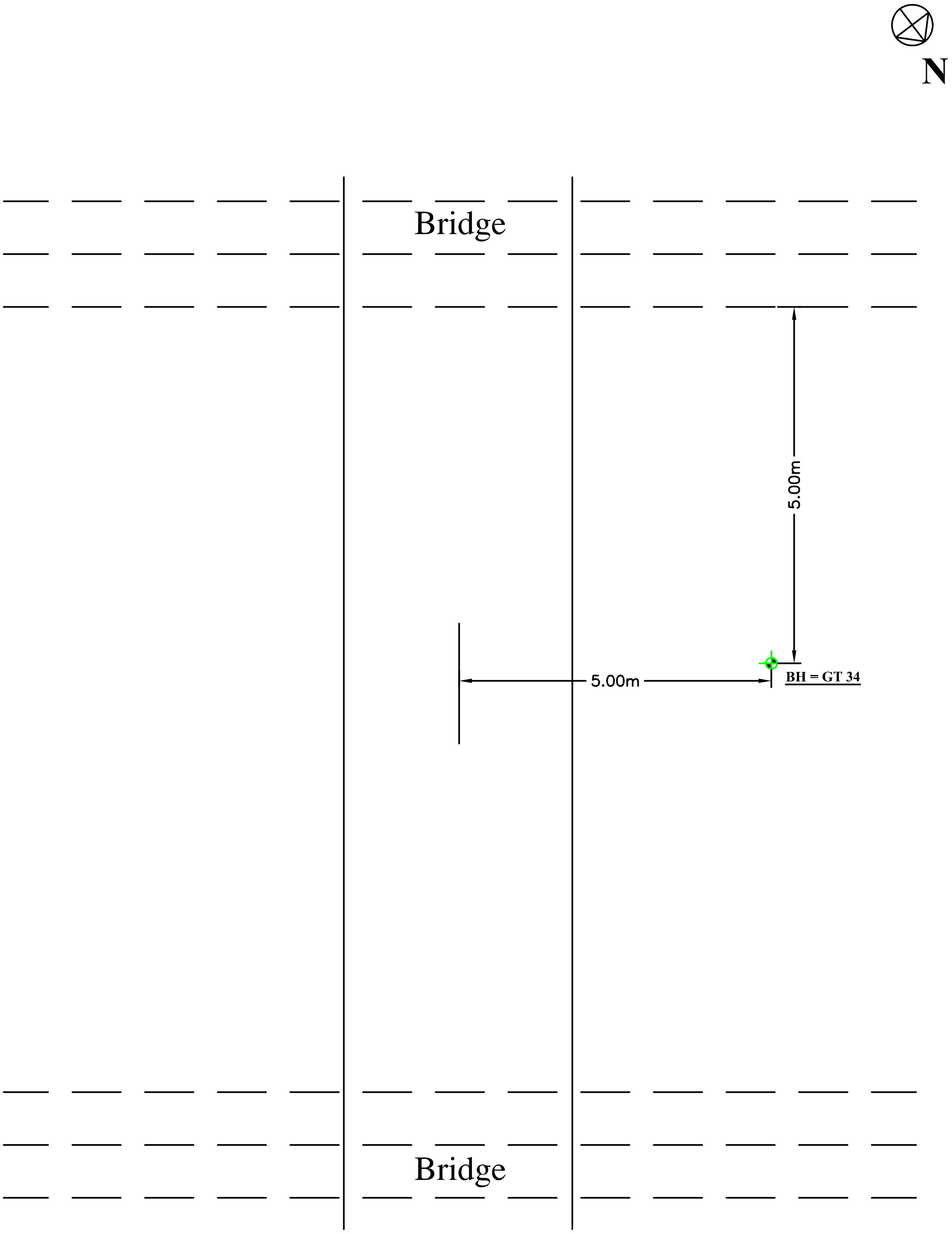


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 35

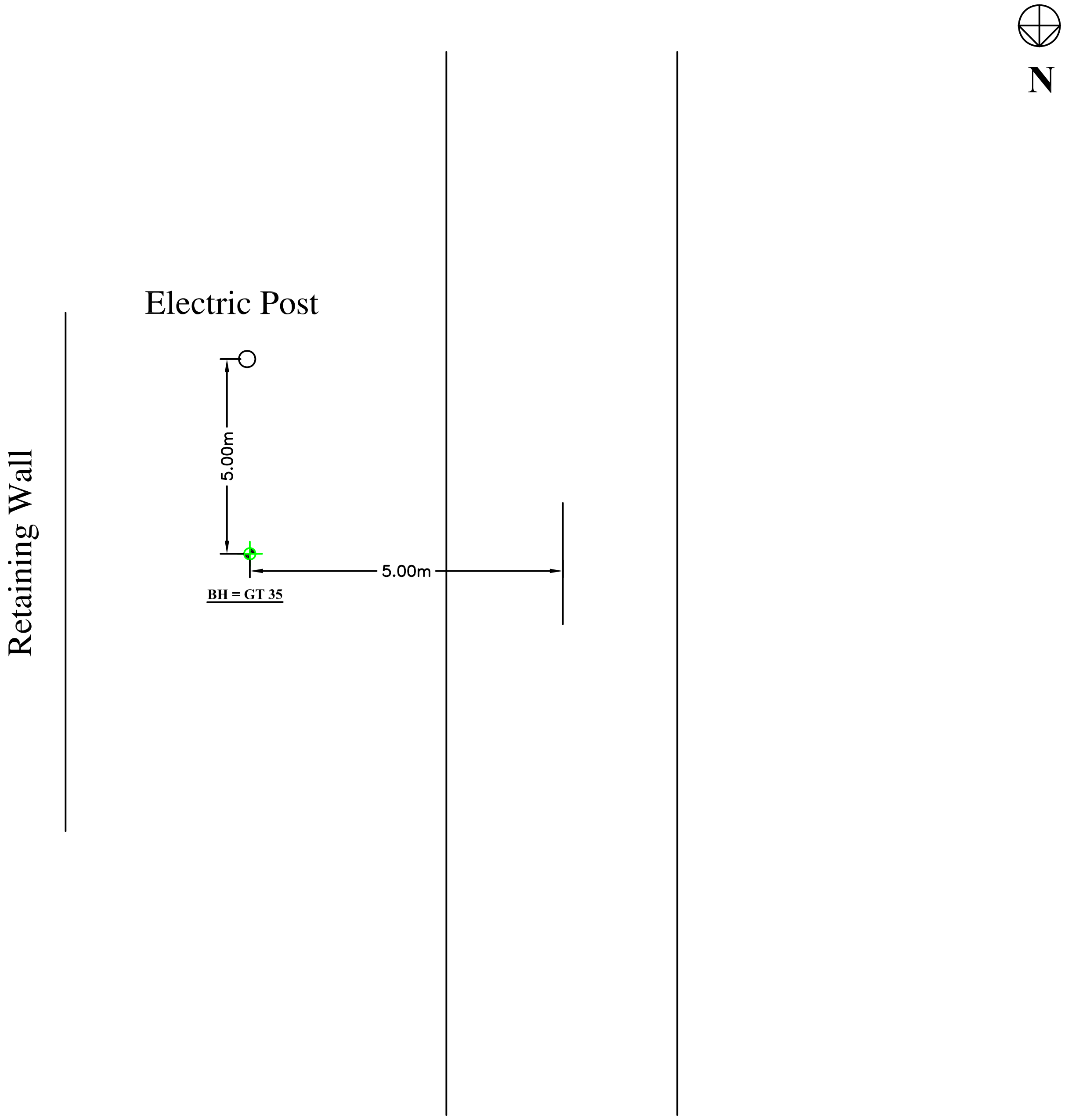


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 36

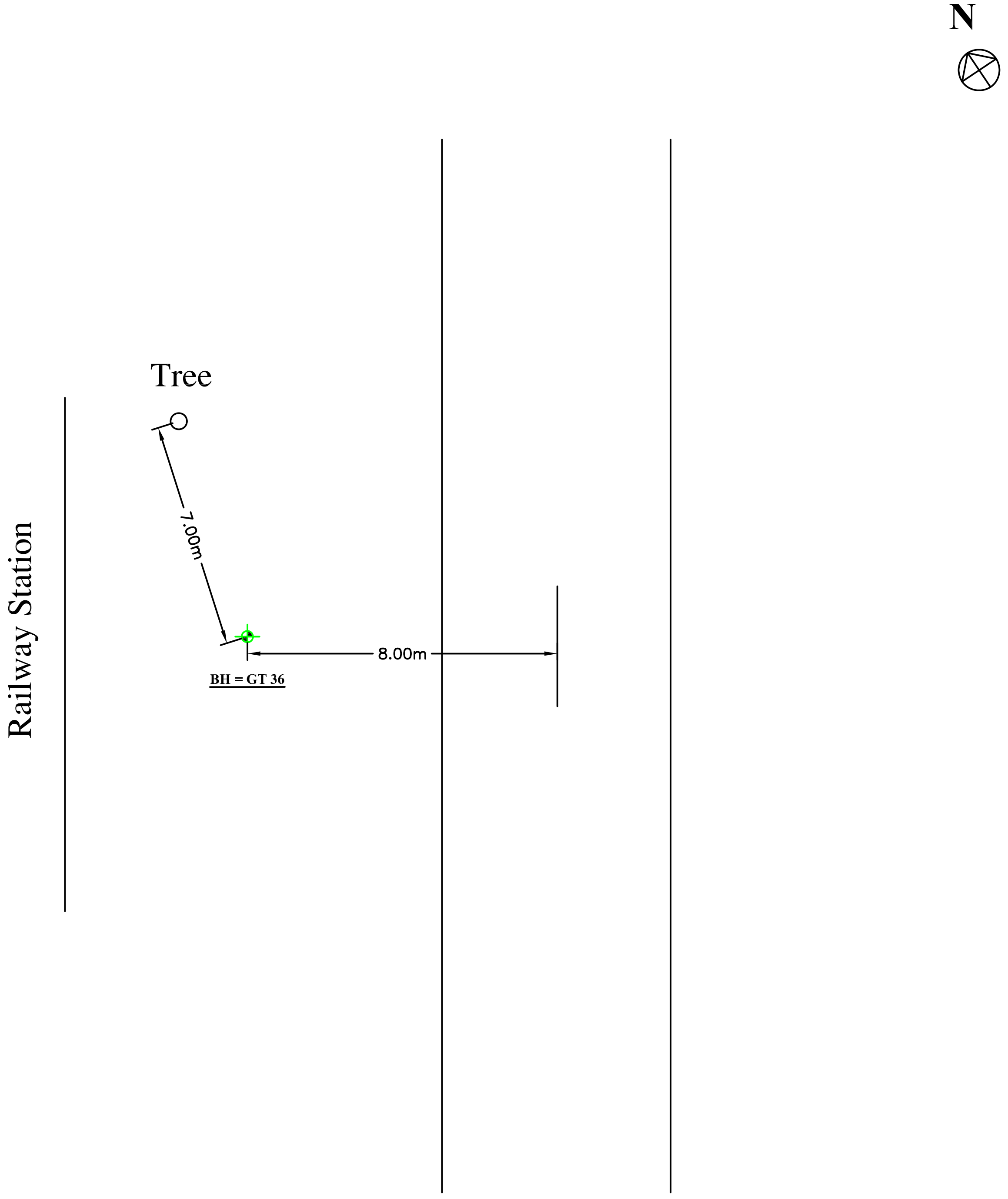


Figure1: Borehole Location Plane

Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 36B

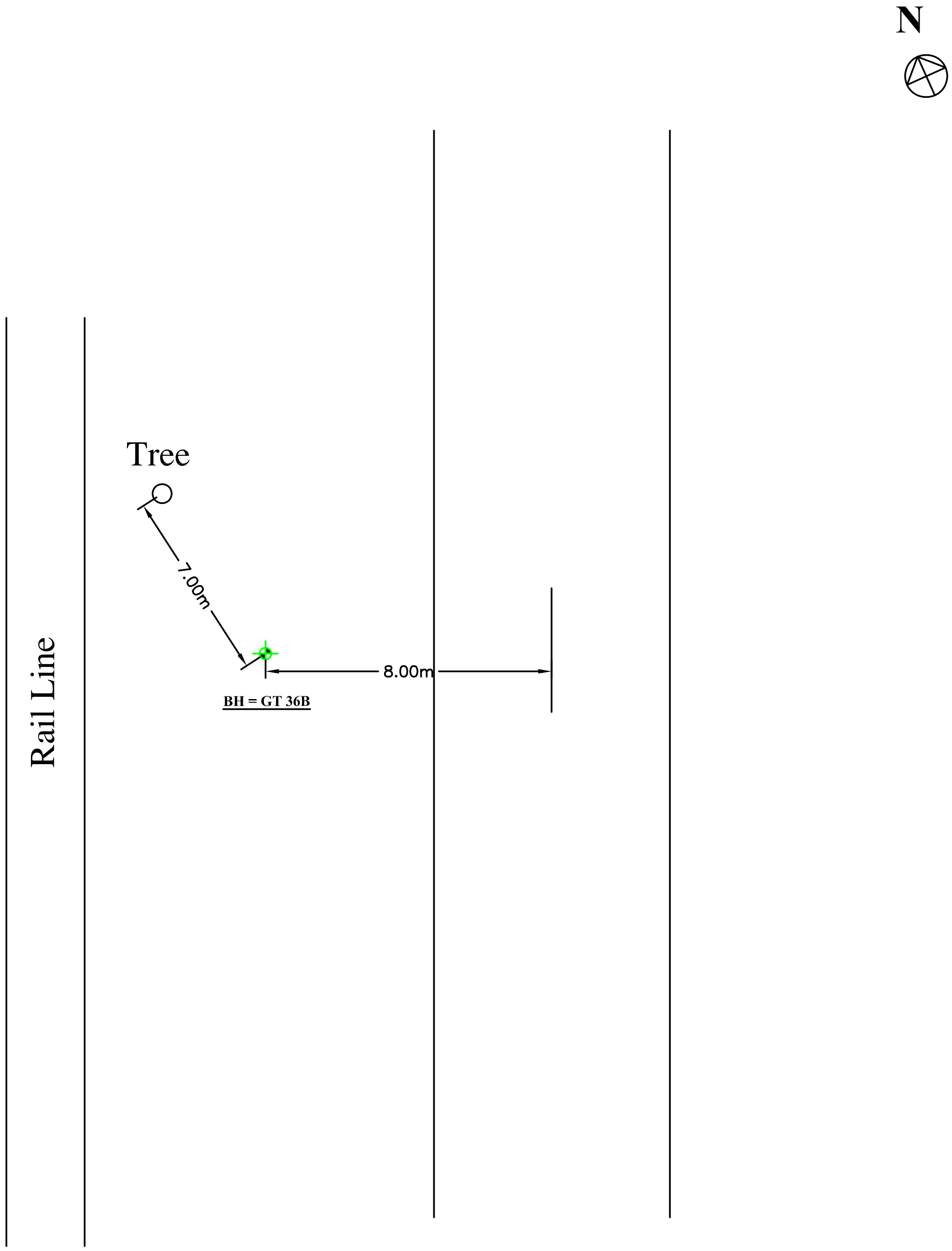


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 37

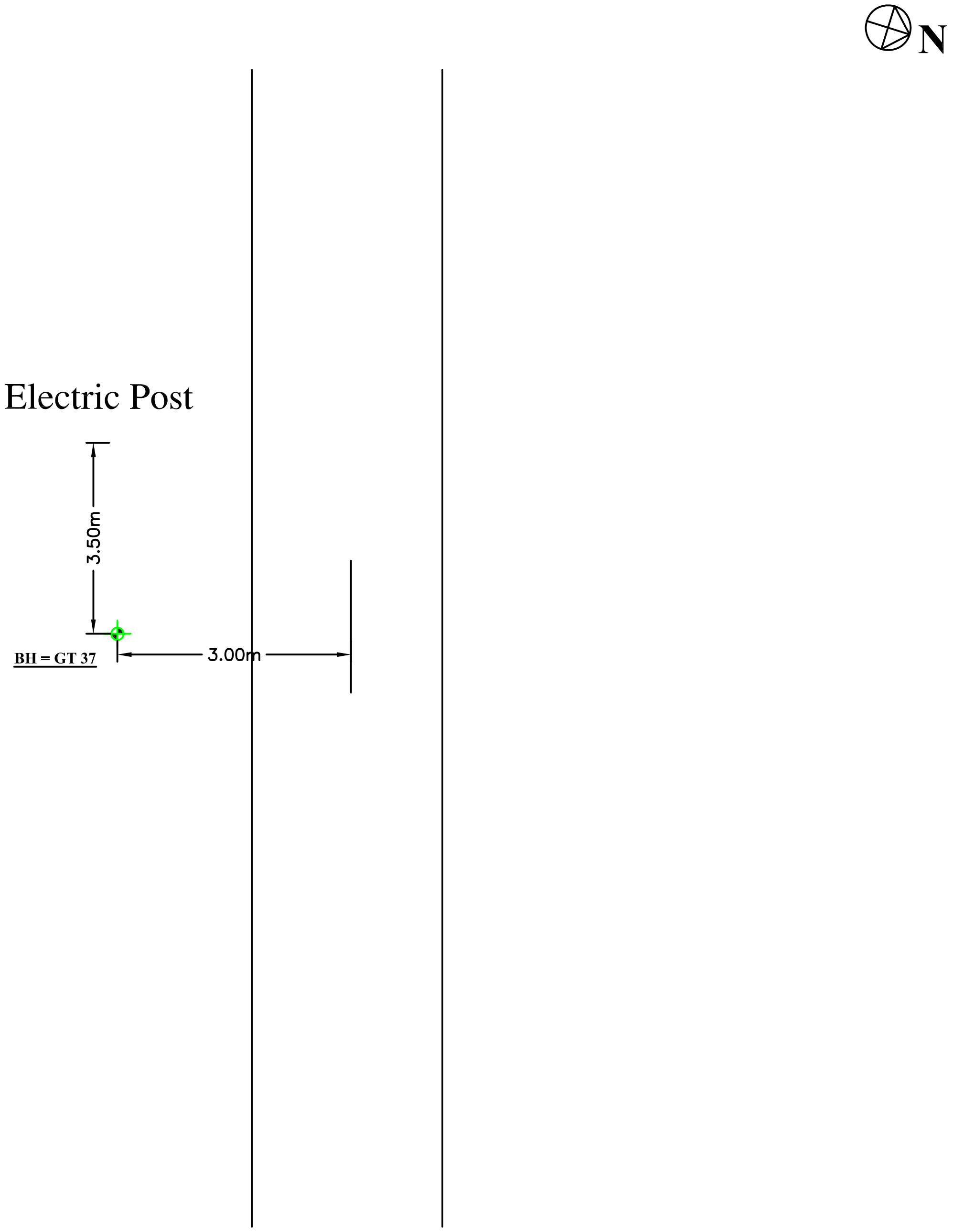


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 38

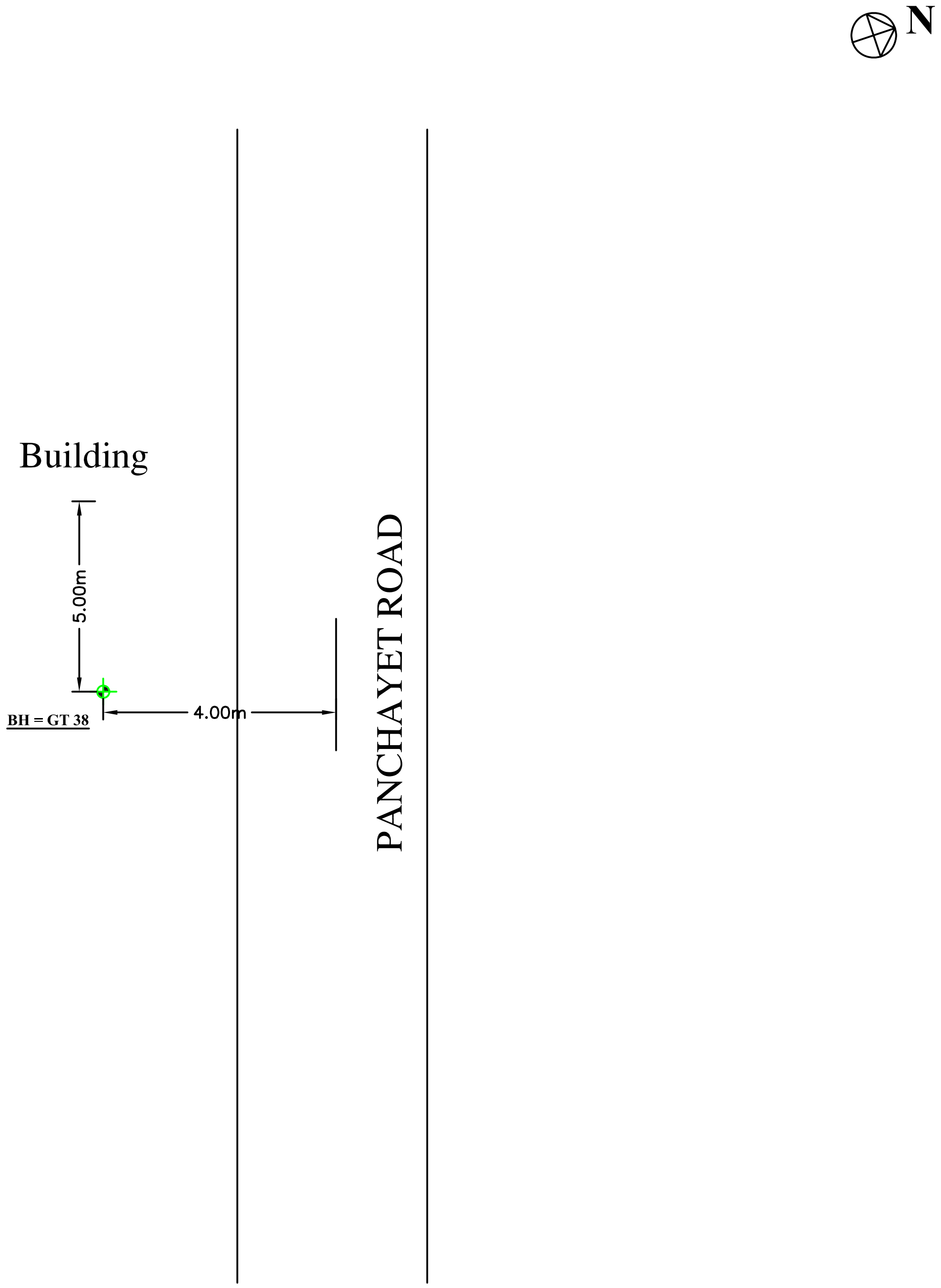


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 39

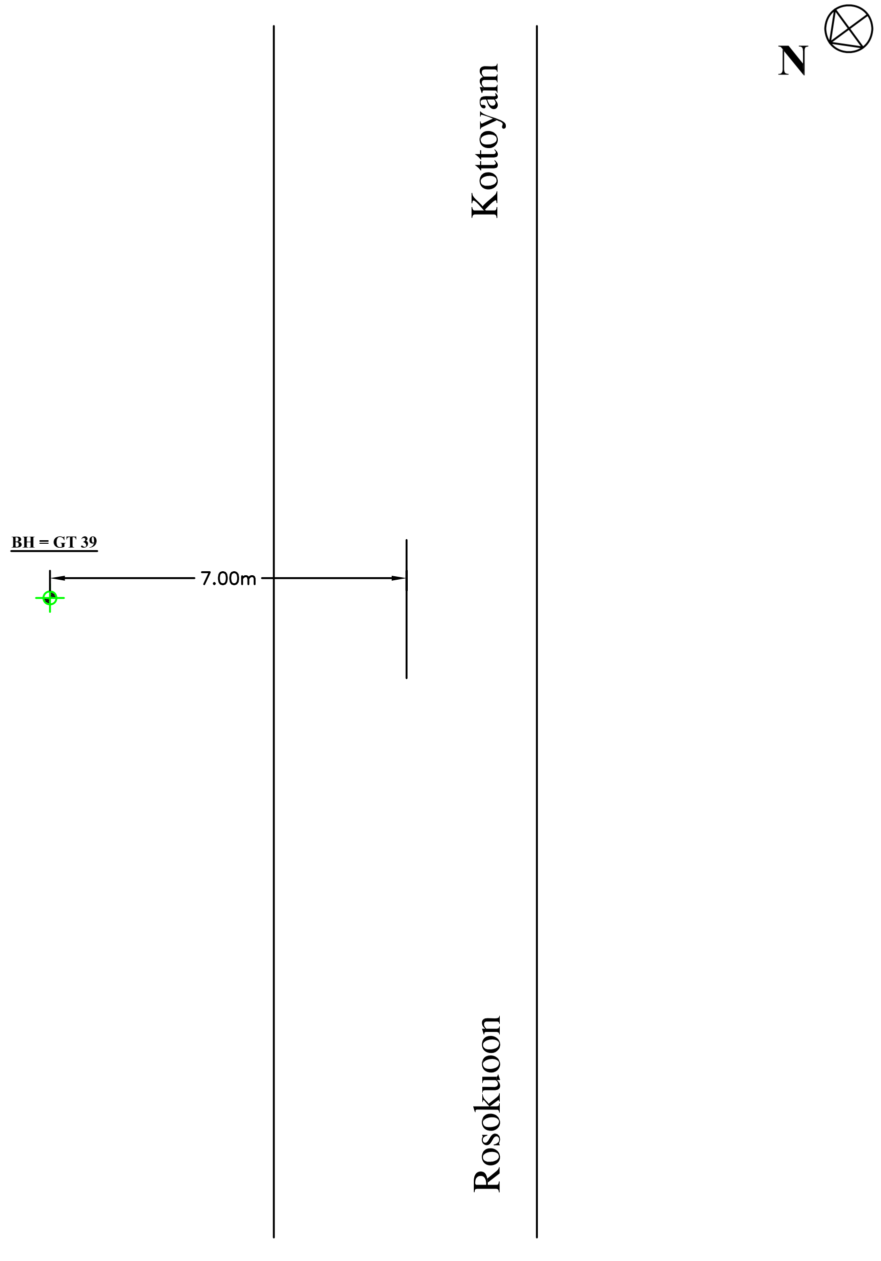


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 40

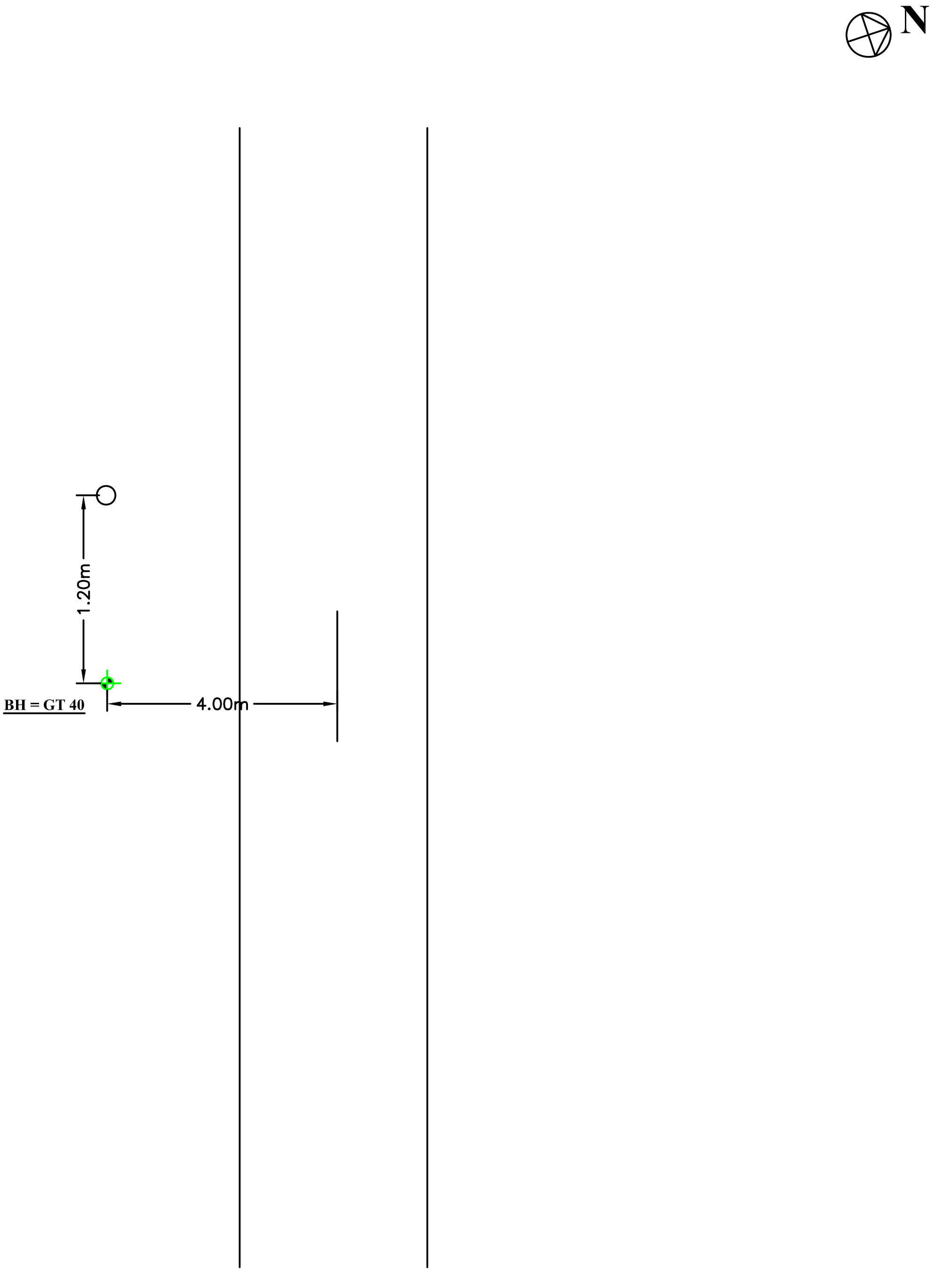


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 41

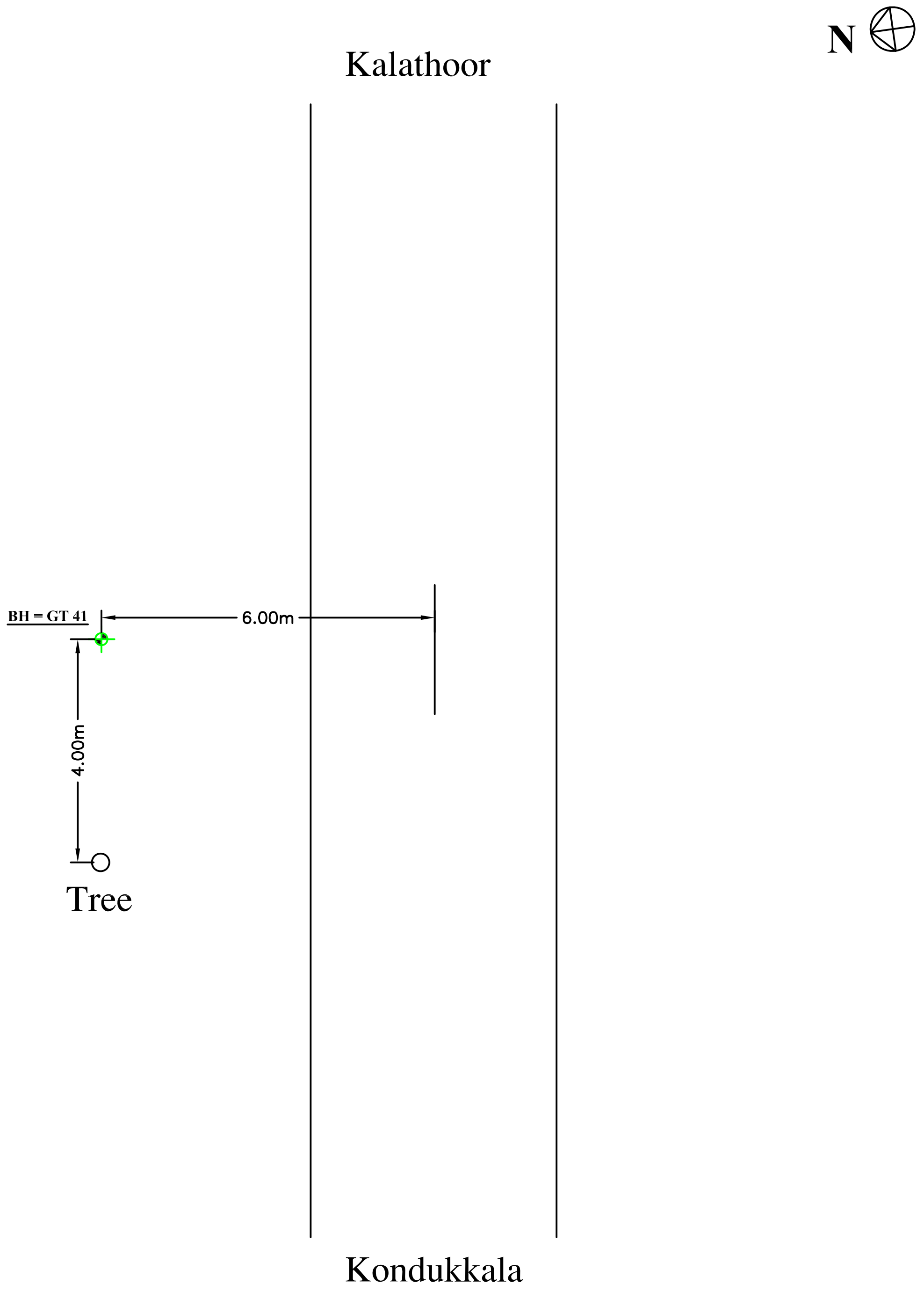


Figure1: Borehole Location Plane

Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 42

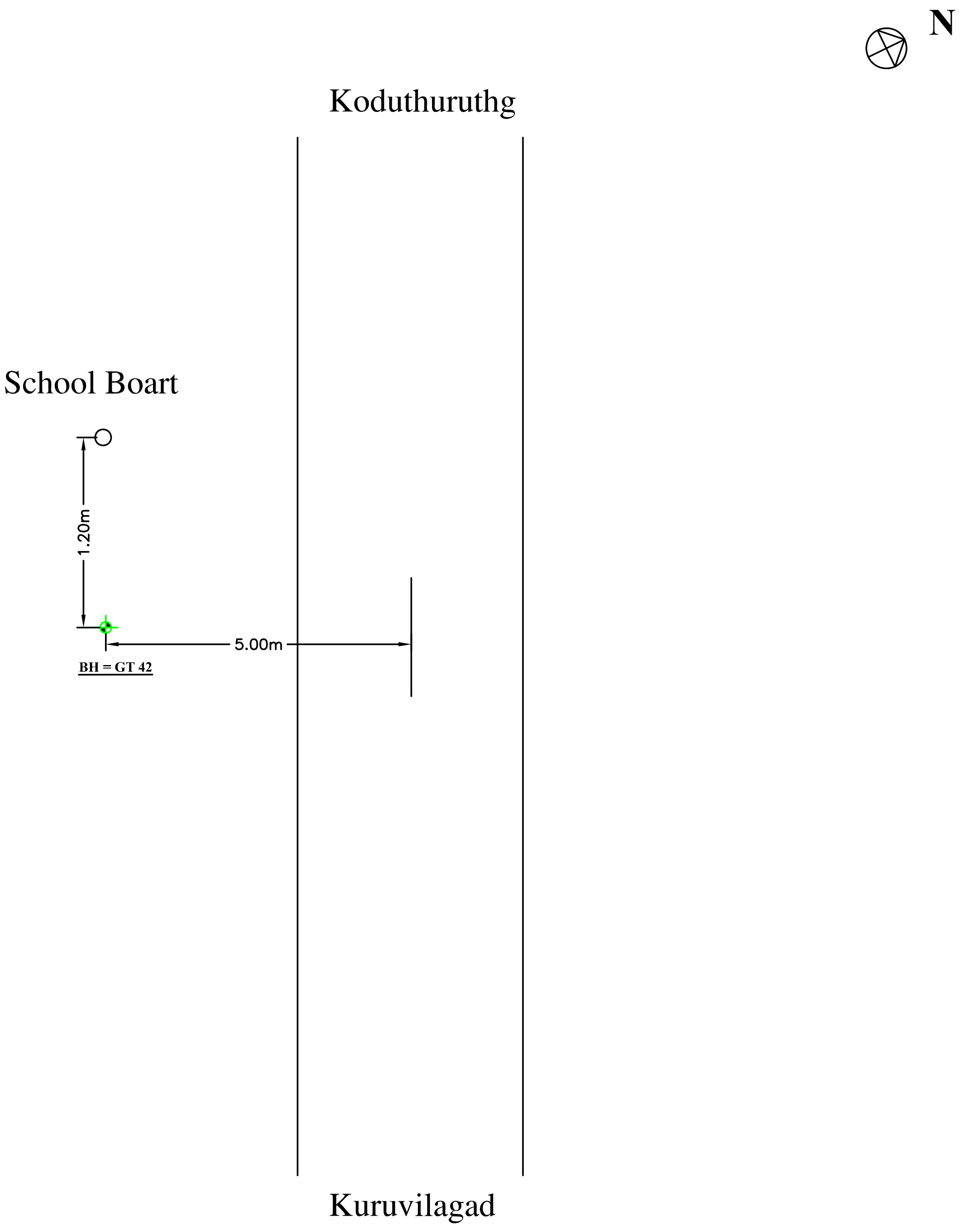


Figure1: Borehole Location Plane
Not to Scale

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 43

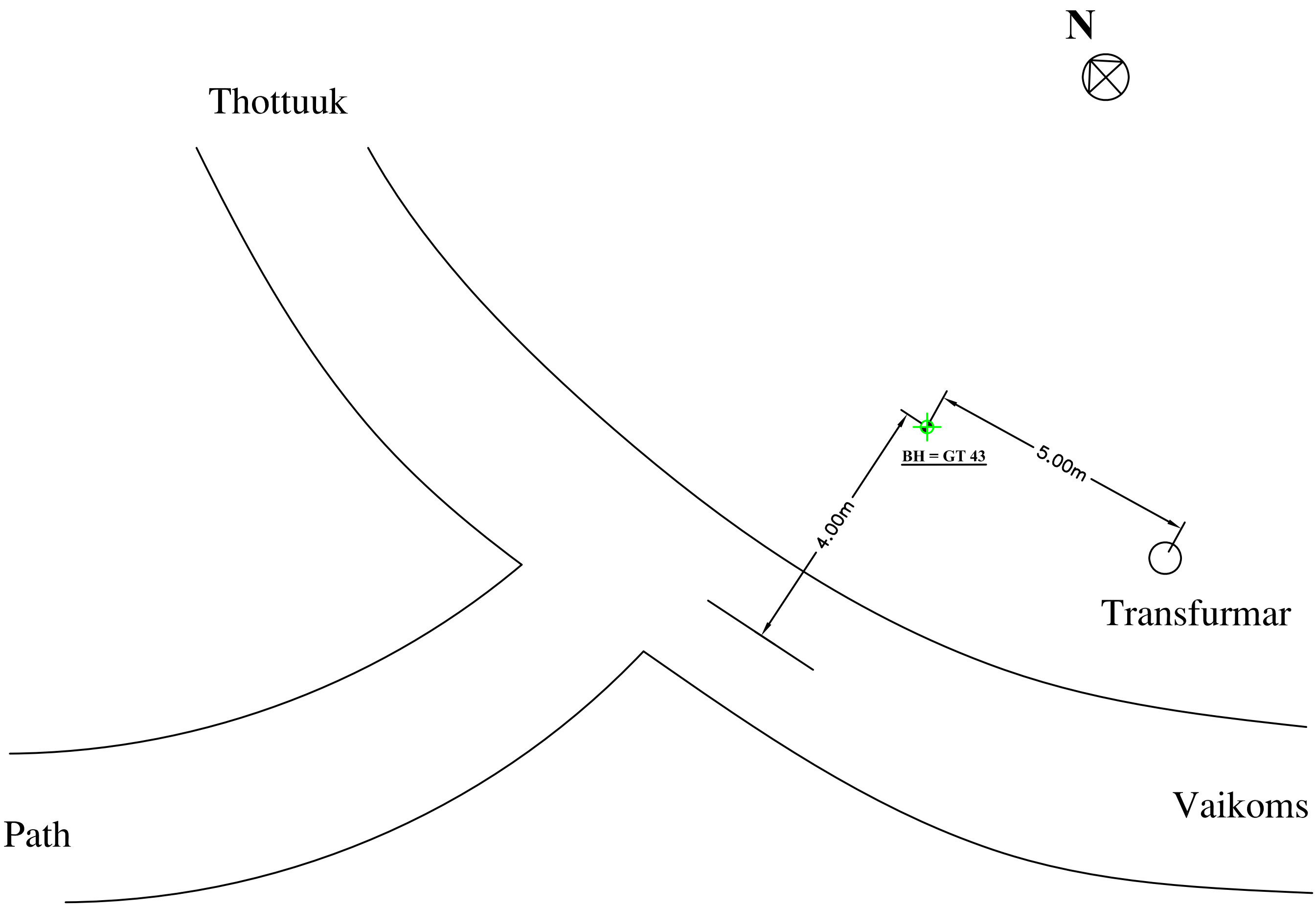


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 44

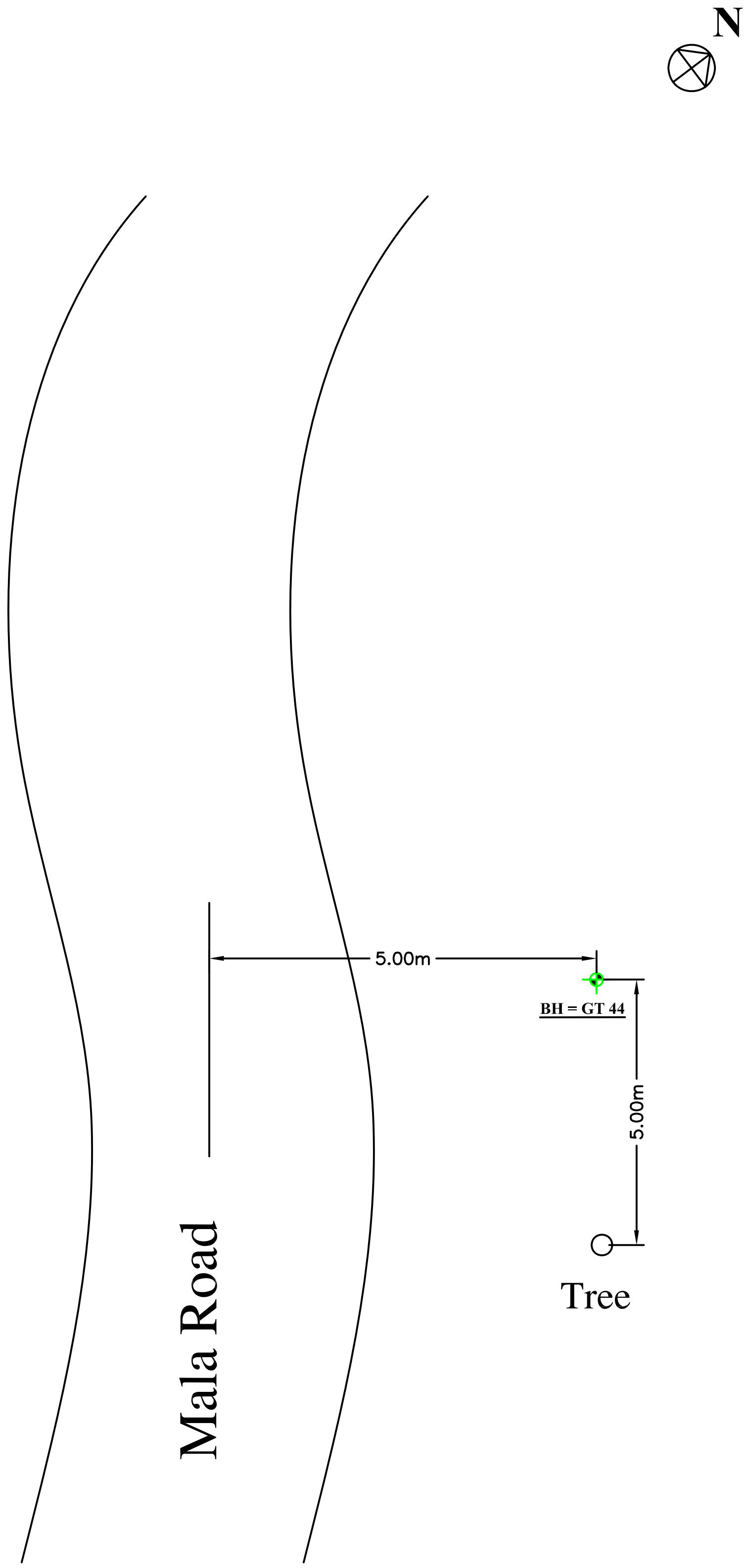


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 44A

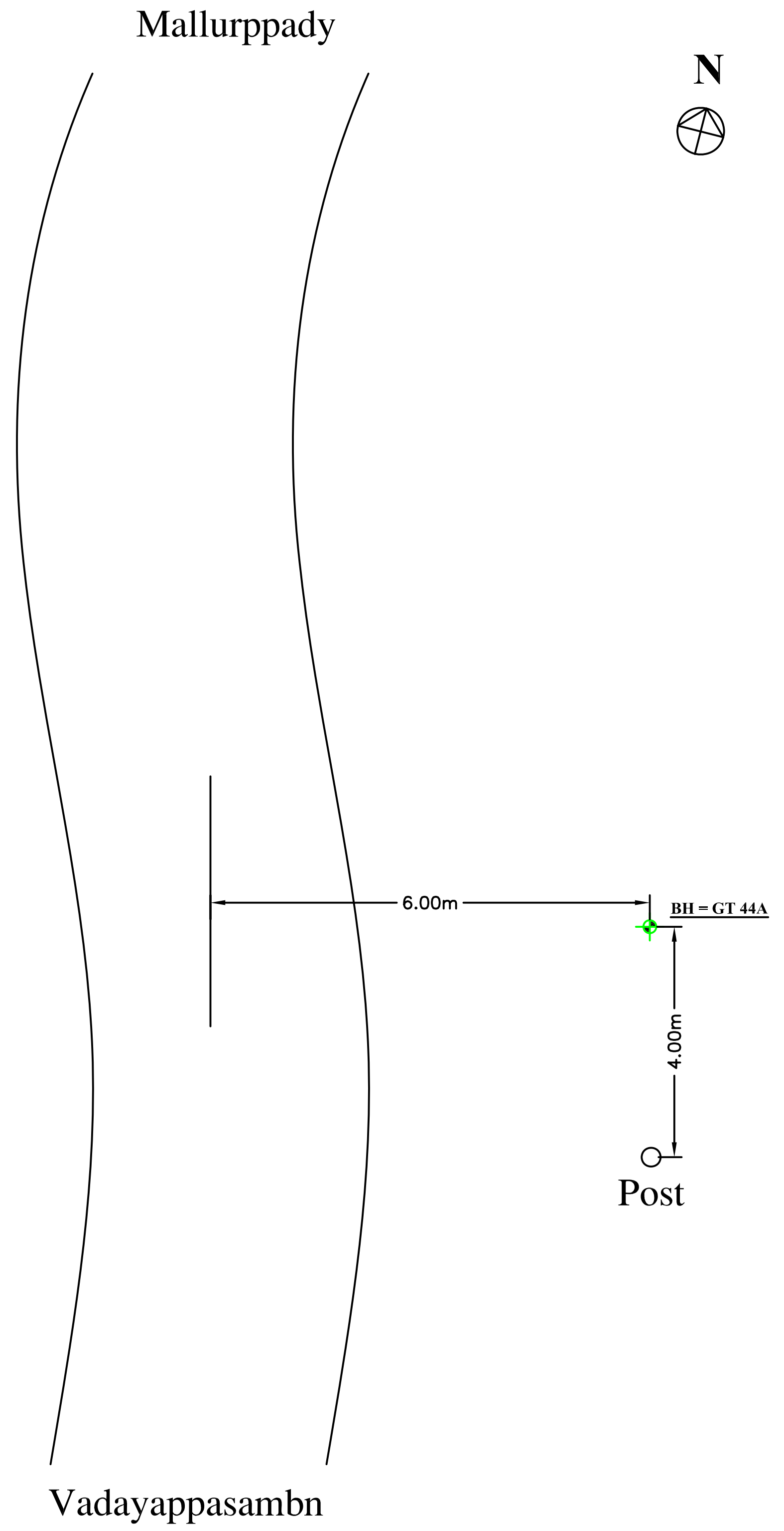


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 44B

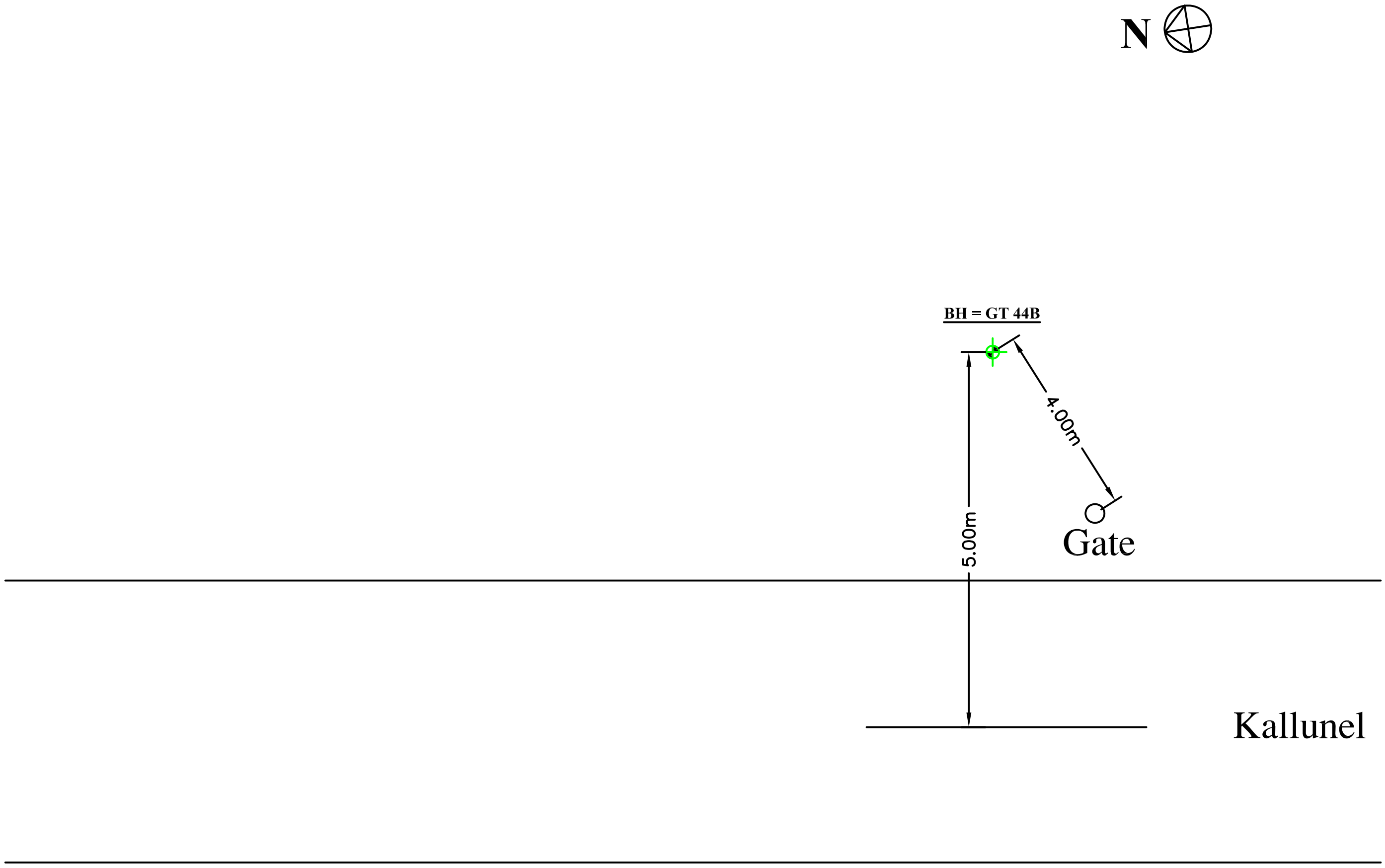


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 45

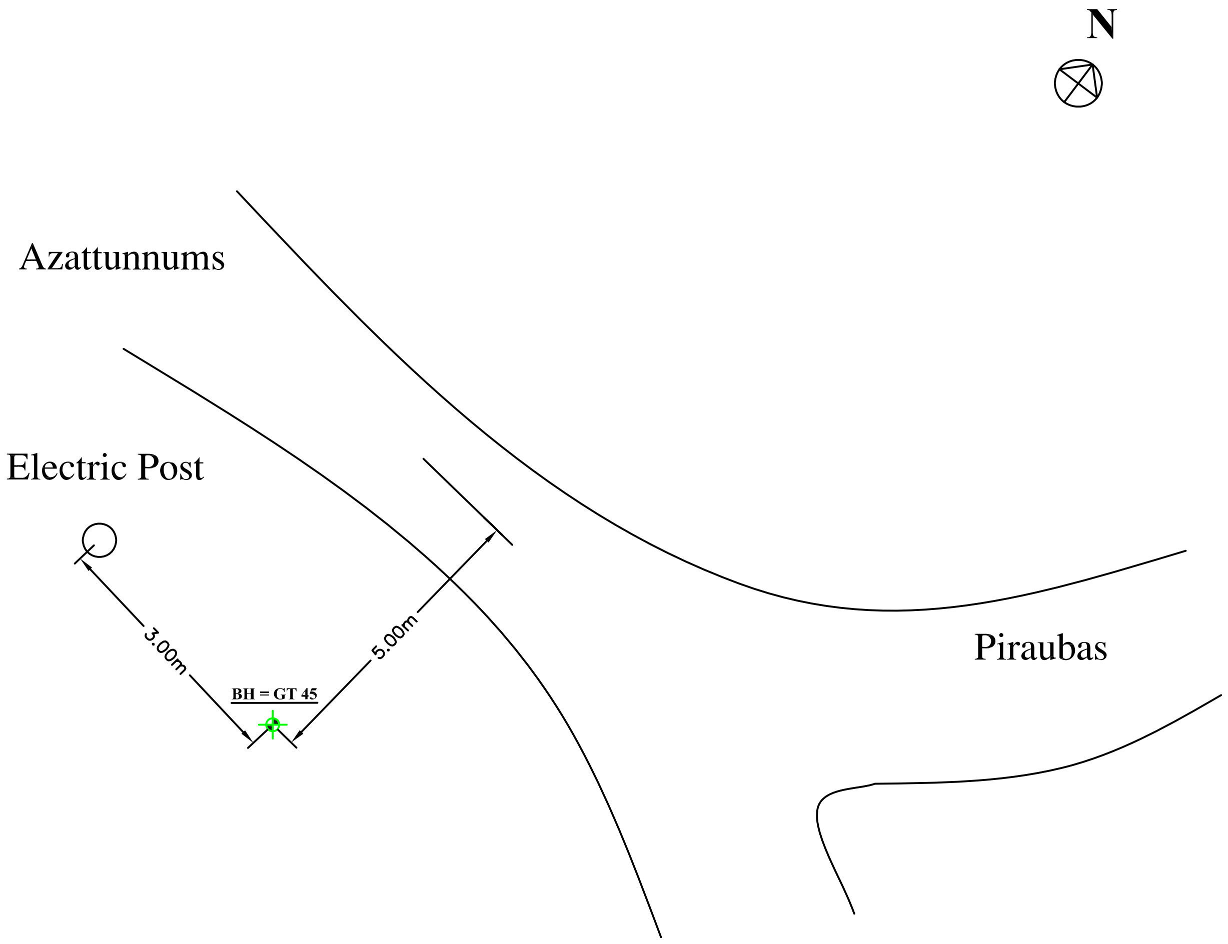


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 46

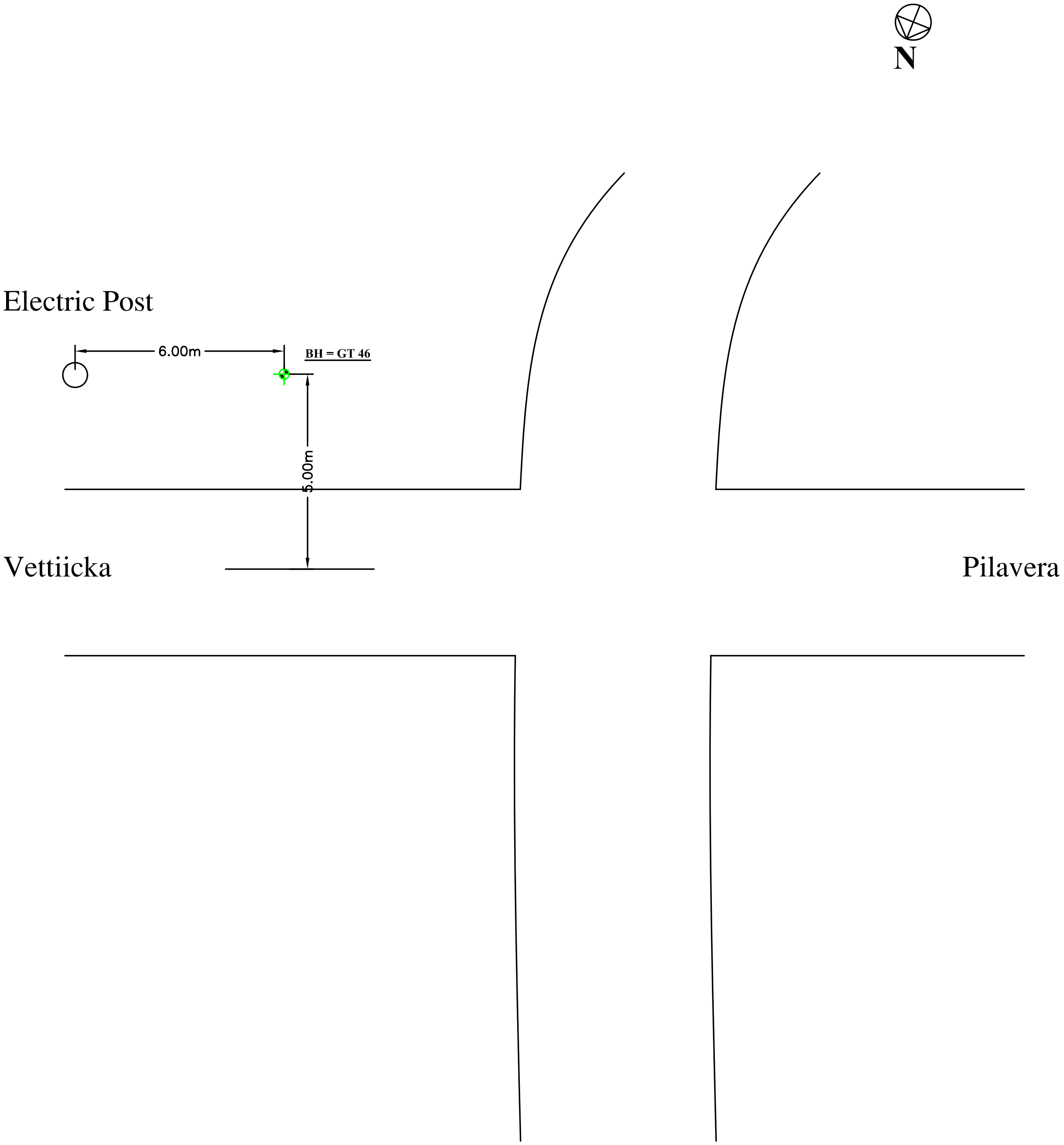


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 47

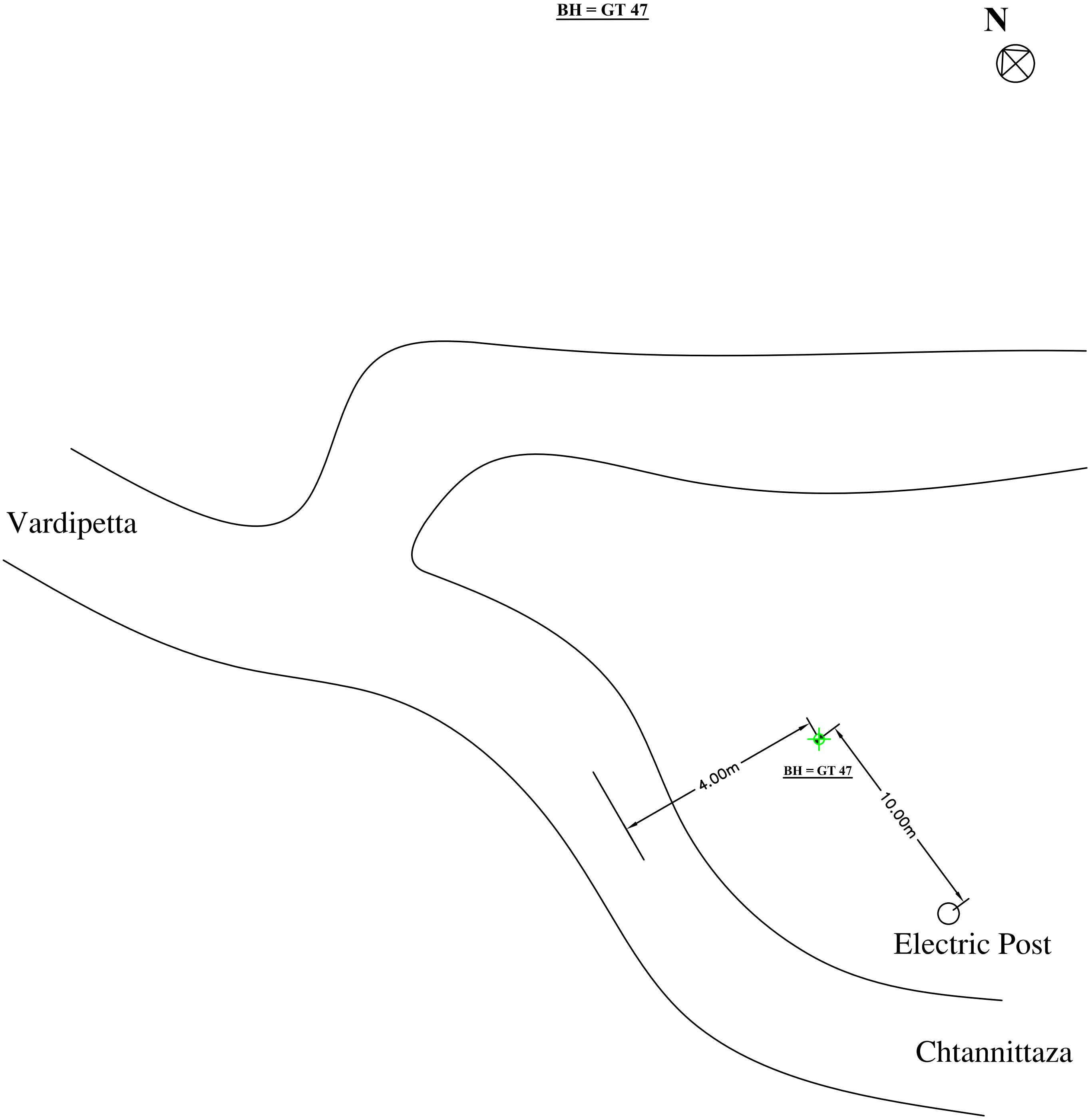


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 48

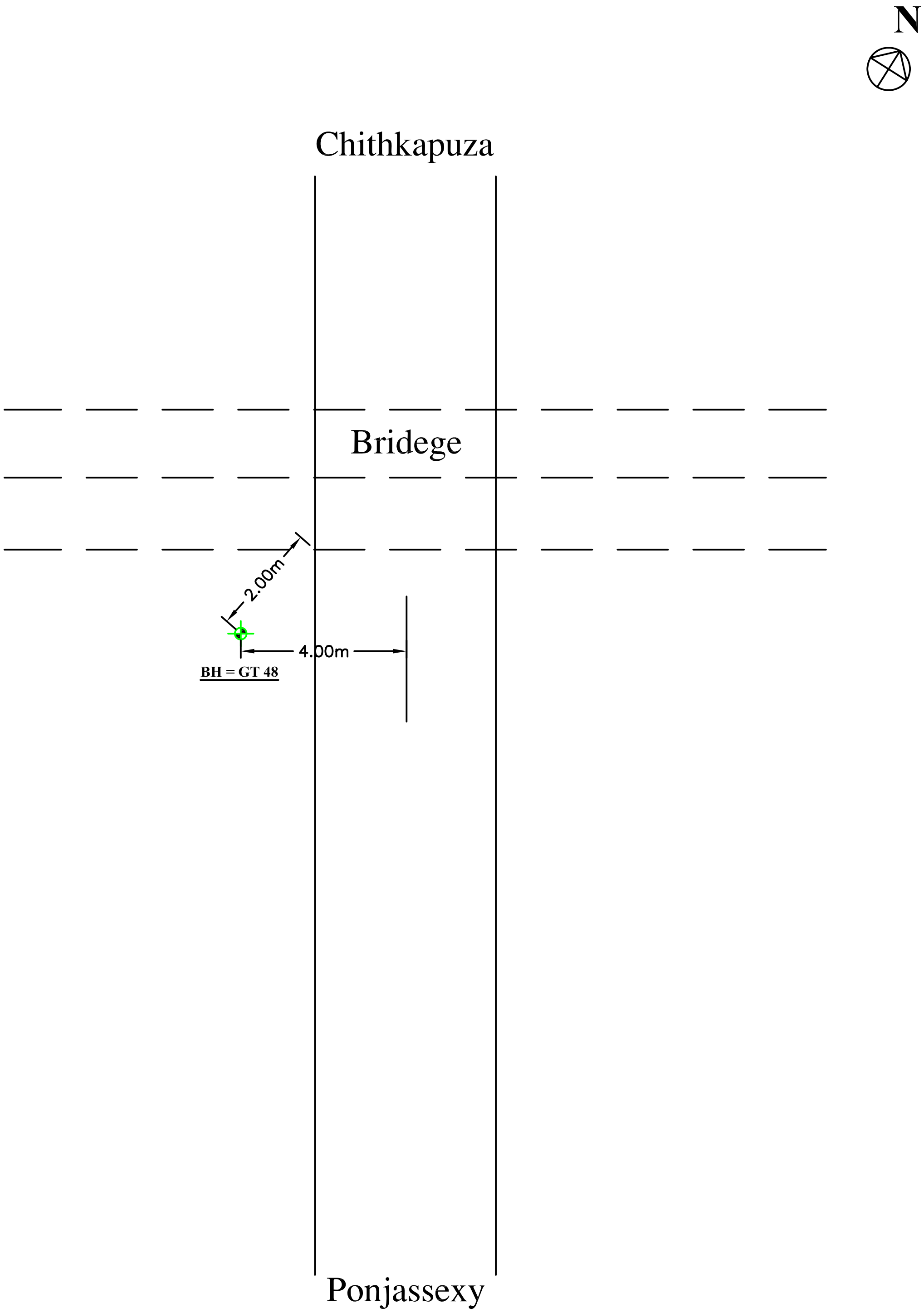


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 49

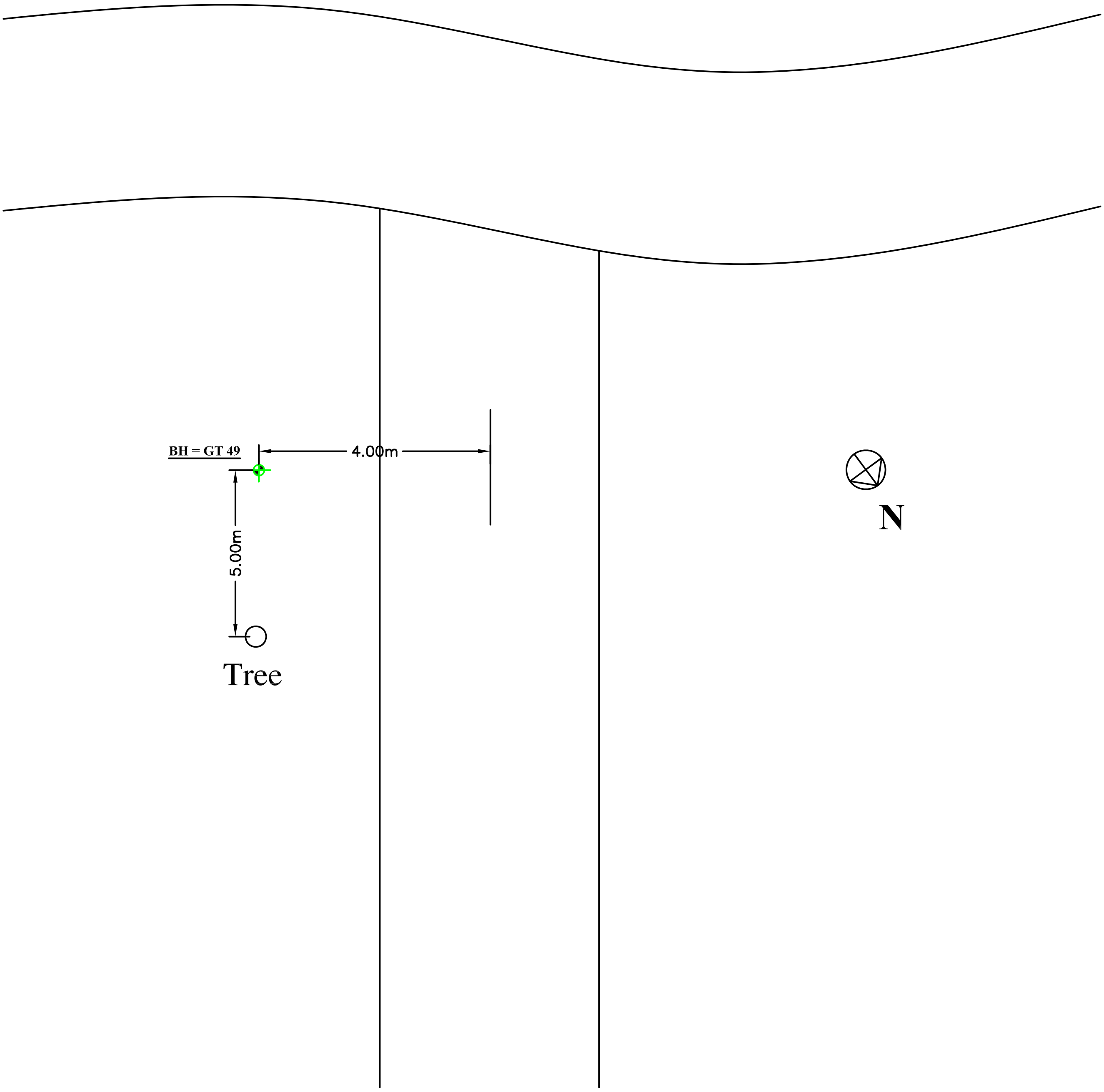
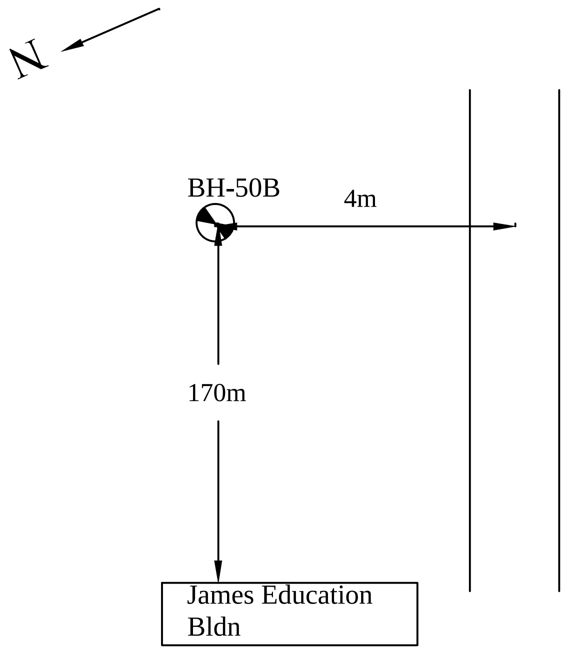


Figure1: Borehole Location Plane
Not to Scale

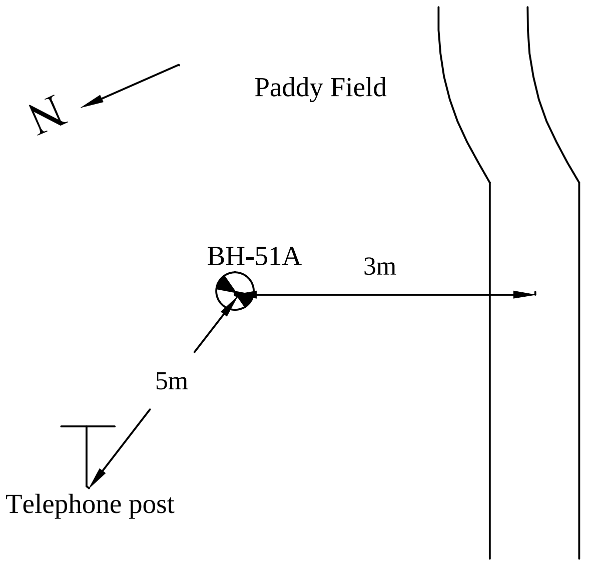
Project: Sub-soil Investigation work for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor

Borehole Location Plan

Borehole No.GT:50B



Borehole No.GT:51A

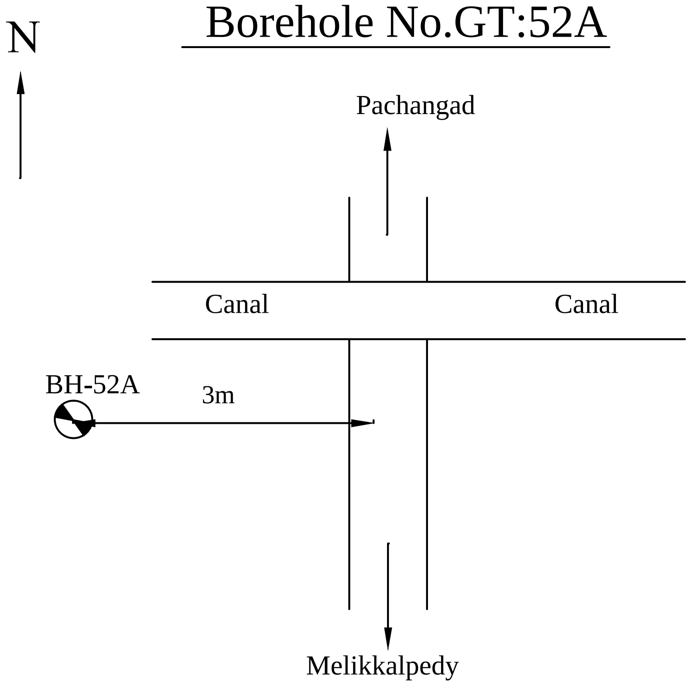


Not to scale	M/s ANAND RAJ INFRATECH PVT. LTD.	Page -

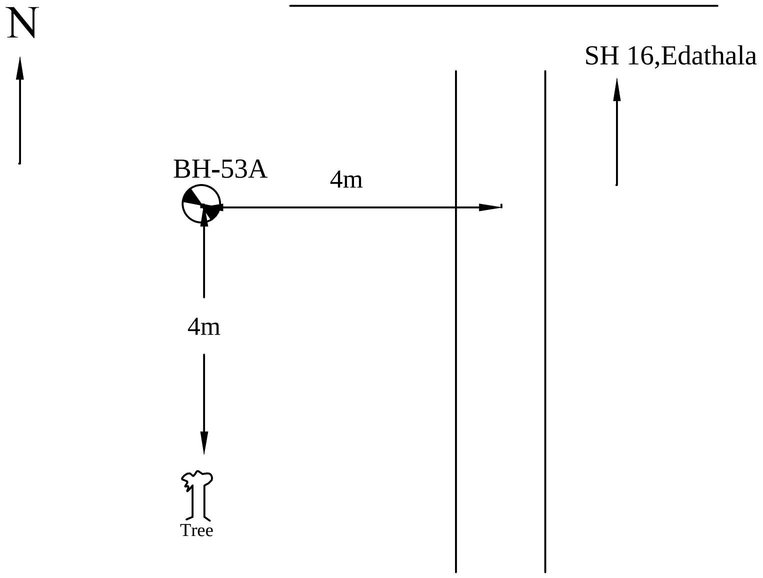
Project: Sub-soil Investigation work for Thiruvananthapuram-
Kasaragod Semi-High-Speed Rail Corridor

Borehole Location Plan

Borehole No.GT:52A



Borehole No.GT:53A

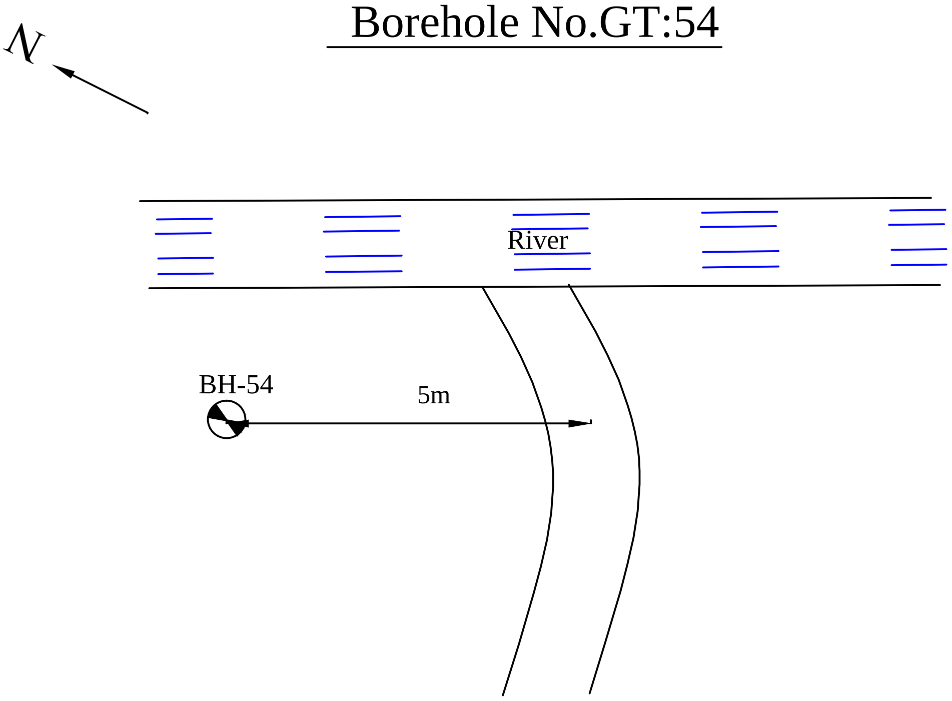


Not to scale	M/s ANAND RAJ INFRATECH PVT. LTD.	Page -

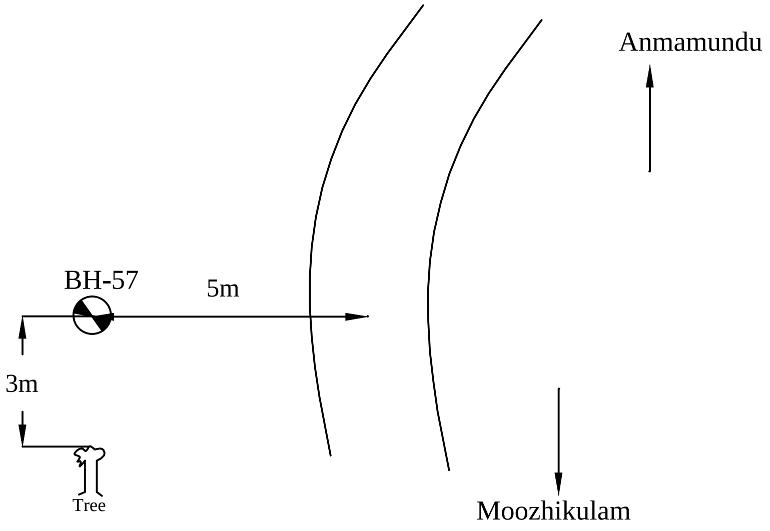
Project: Sub-soil Investigation work for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor

Borehole Location Plan

Borehole No.GT:54



Borehole No.GT:57

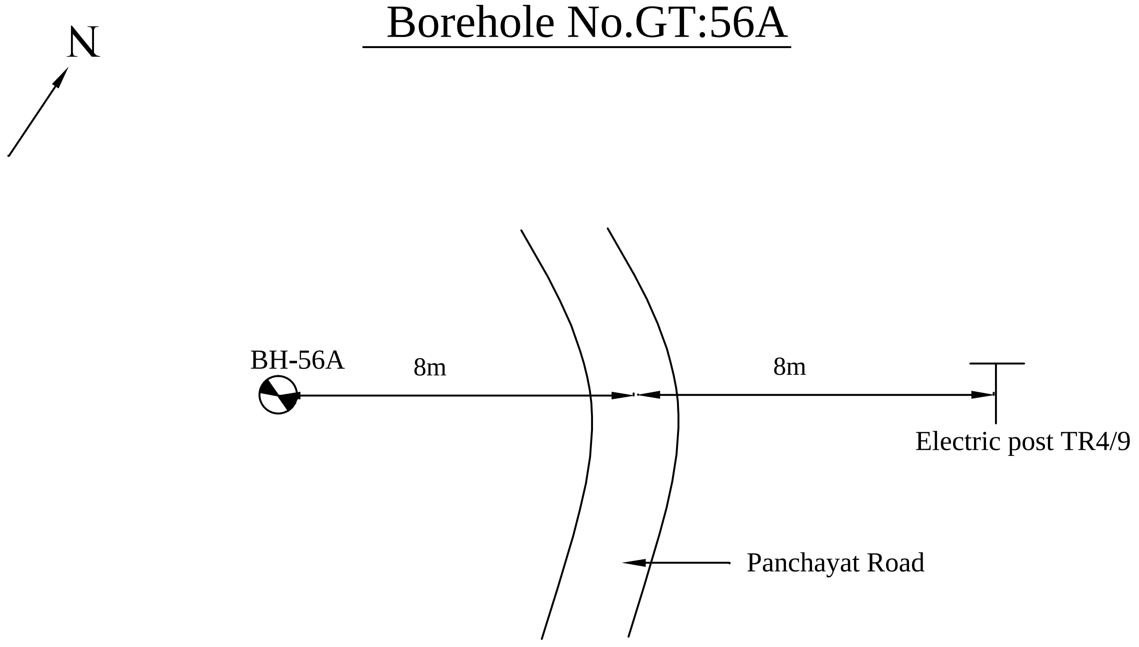


Not to scale	M/s ANAND RAJ INFRATECH PVT. LTD.	Page -

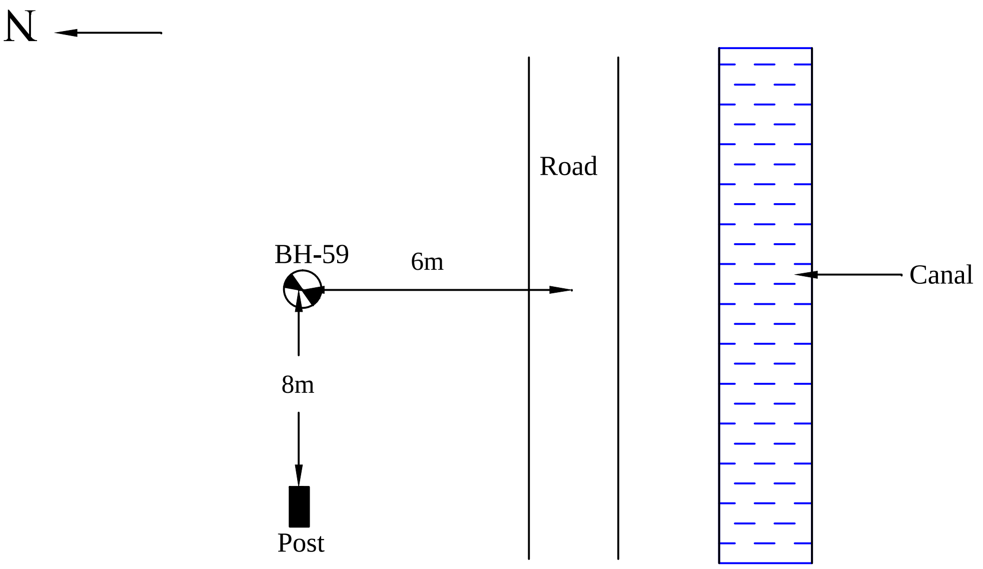
Project: Sub-soil Investigation work for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor

Borehole Location Plan

Borehole No.GT:56A



Borehole No.GT:59

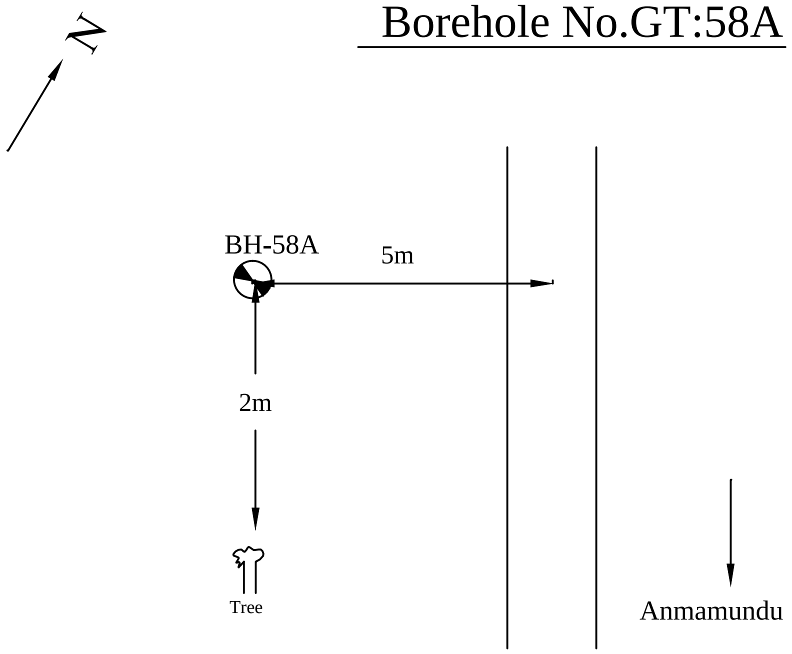


Not to scale	M/s ANAND RAJ INFRATECH PVT. LTD.	Page -

Project: Sub-soil Investigation work for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor

Borehole Location Plan

Borehole No.GT:58A

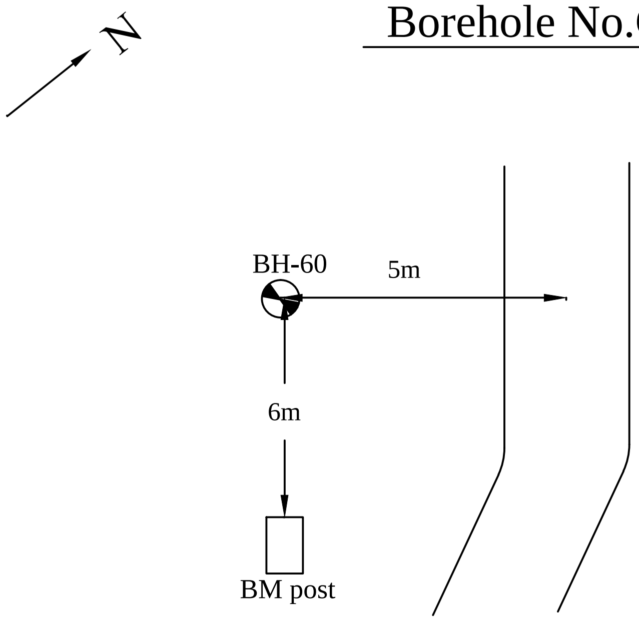


Not to scale	M/s ANAND RAJ INFRATECH PVT. LTD.	Page -

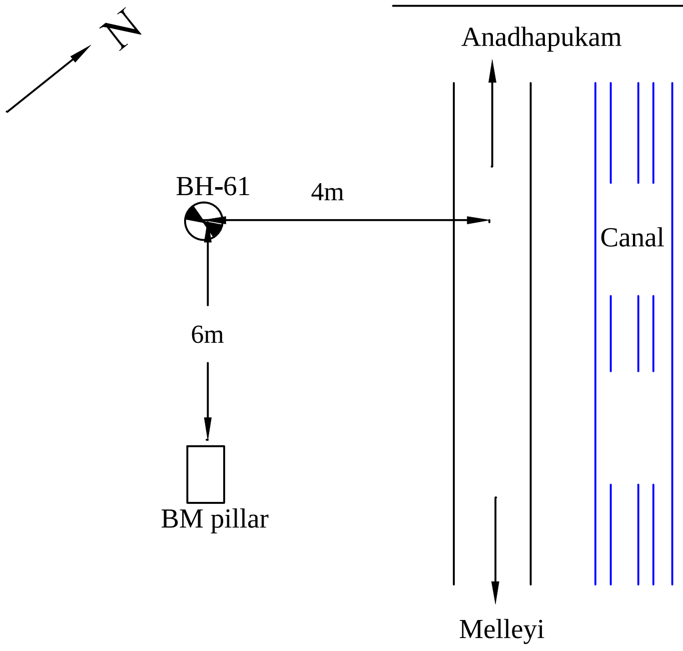
Project: Sub-soil Investigation work for Thiruvananthapuram-
Kasaragod Semi-High-Speed Rail Corridor

Borehole Location Plan

Borehole No.GT:60



Borehole No.GT:61

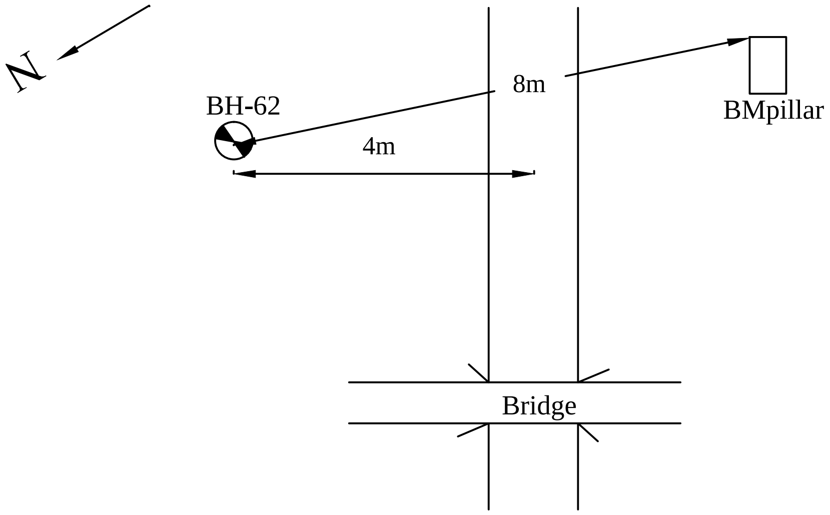


Not to scale	M/s ANAND RAJ INFRATECH PVT. LTD.	Page -

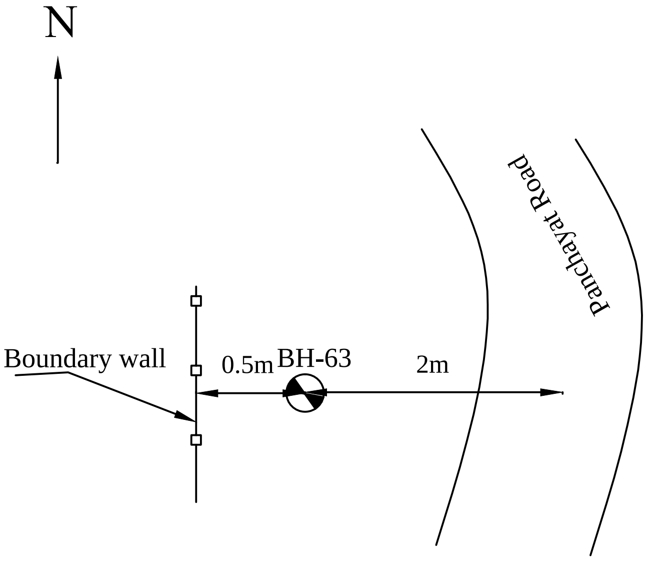
Project: Sub-soil Investigation work for Thiruvananthapuram-
Kasaragod Semi-High-Speed Rail Corridor

Borehole Location Plan

Borehole No.GT:62



Borehole No.GT:63

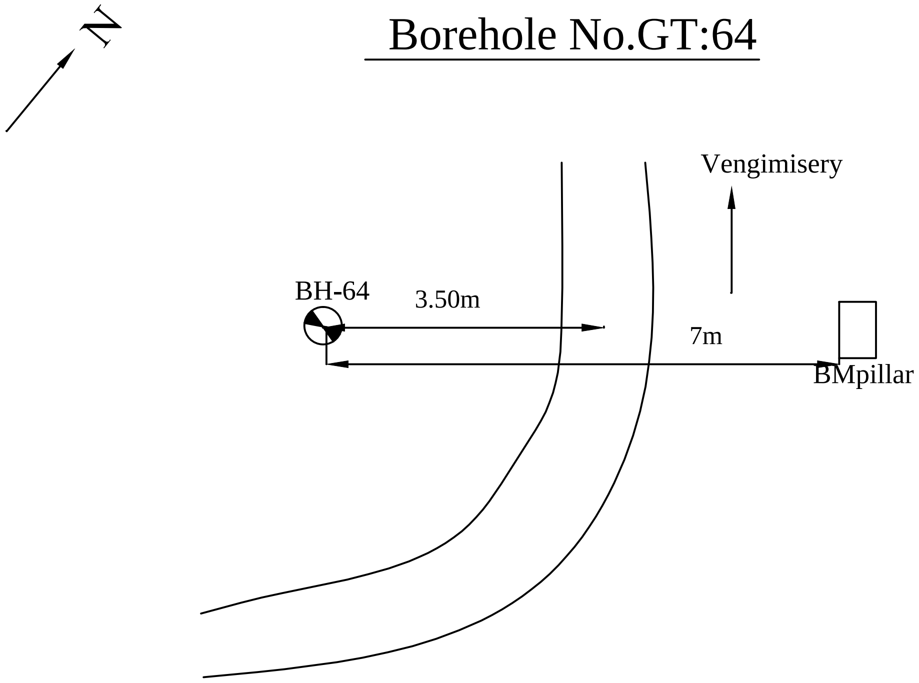


Not to scale	M/s ANAND RAJ INFRATECH PVT. LTD.	Page -

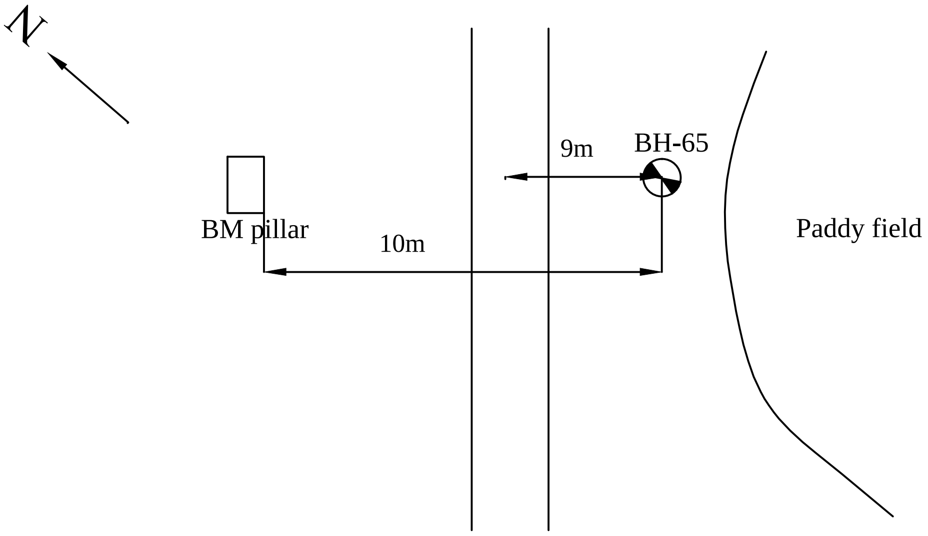
Project: Sub-soil Investigation work for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor

Borehole Location Plan

Borehole No.GT:64



Borehole No.GT:65



Not to scale

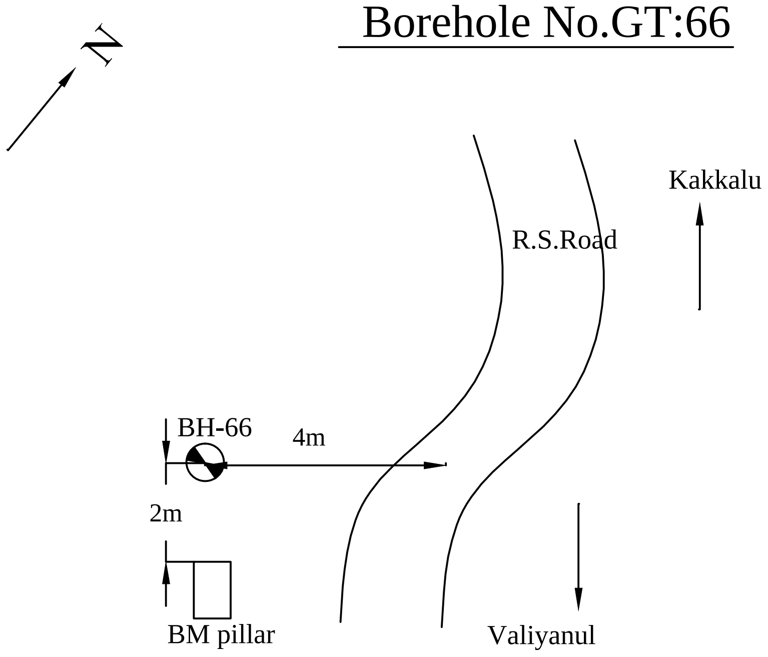
M/s ANAND RAJ INFRATECH PVT. LTD.

Page -

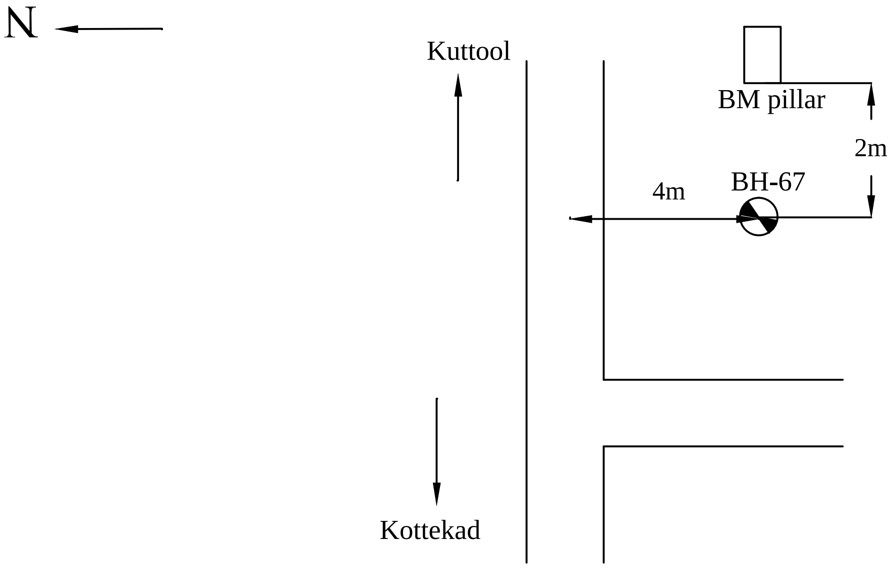
Project: Sub-soil Investigation work for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor

Borehole Location Plan

Borehole No.GT:66



Borehole No.GT:67



Not to scale

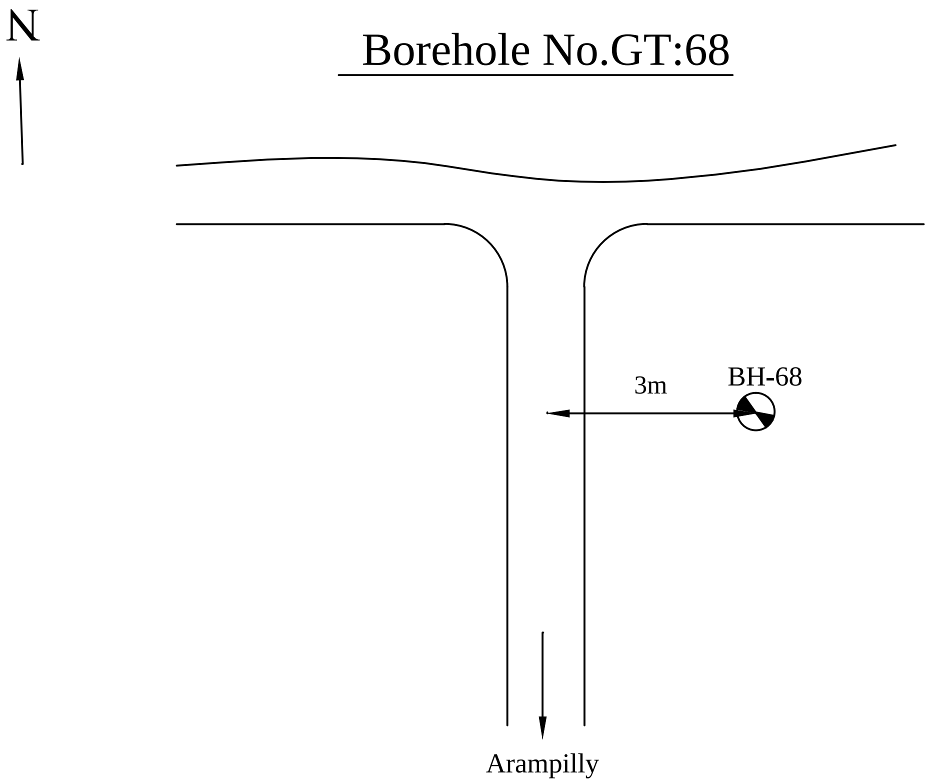
M/s ANAND RAJ INFRATECH PVT. LTD.

Page -

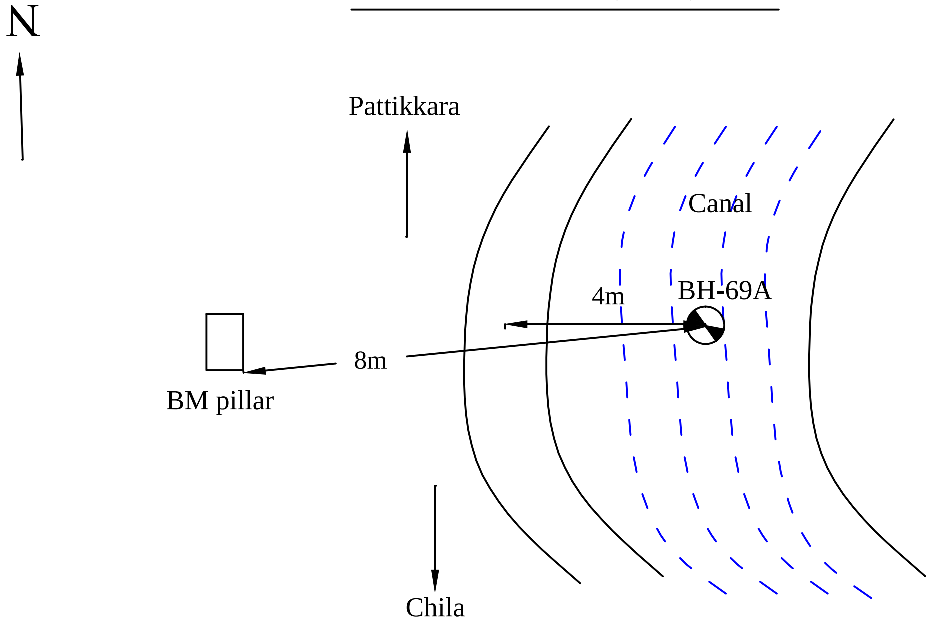
Project: Sub-soil Investigation work for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor

Borehole Location Plan

Borehole No.GT:68



Borehole No.GT:69A

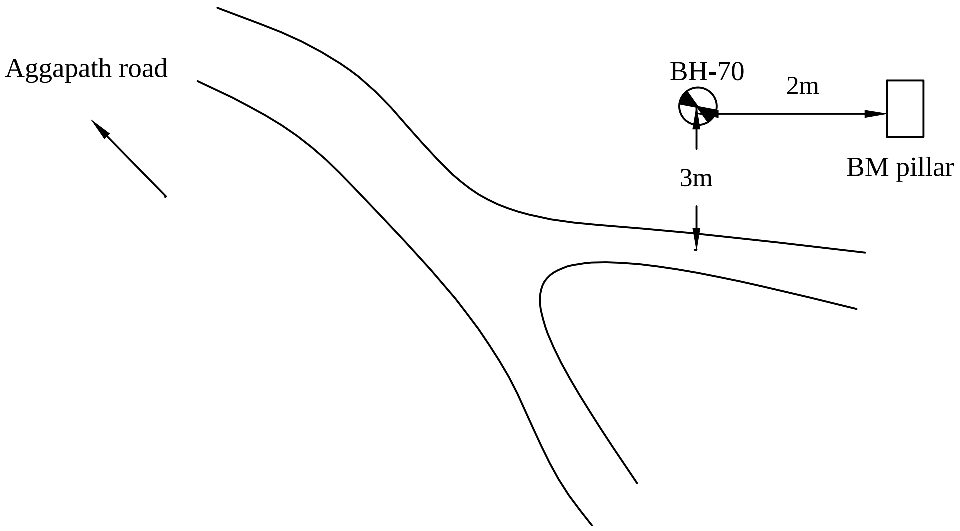


Not to scale	M/s ANAND RAJ INFRATECH PVT. LTD.	Page -

Project: Sub-soil Investigation work for Thiruvananthapuram-
Kasaragod Semi-High-Speed Rail Corridor

Borehole Location Plan

Borehole No.GT:70

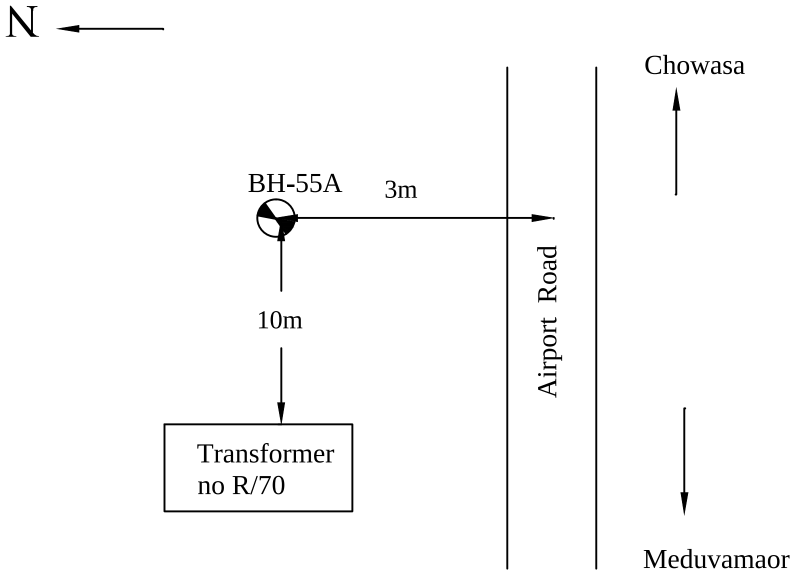


Not to scale	M/s ANAND RAJ INFRATECH PVT. LTD.	Page -

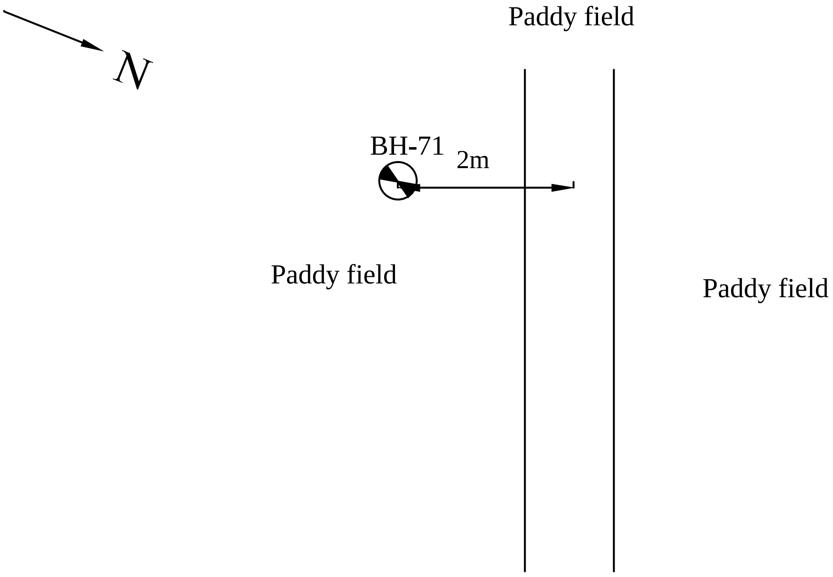
Project: Sub-soil Investigation work for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor

Borehole Location Plan

Borehole No.GT:55A



Borehole No.GT:71

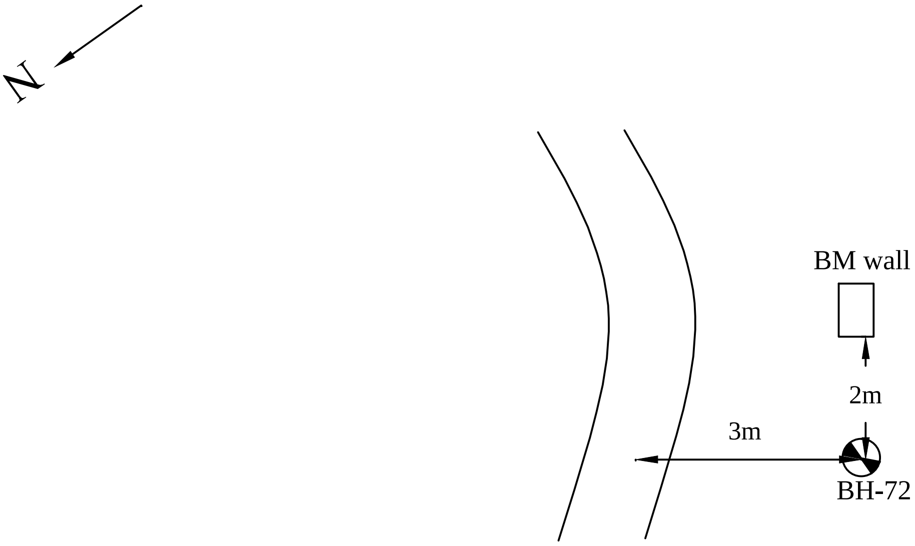


Not to scale	M/s ANAND RAJ INFRATECH PVT. LTD.	Page -

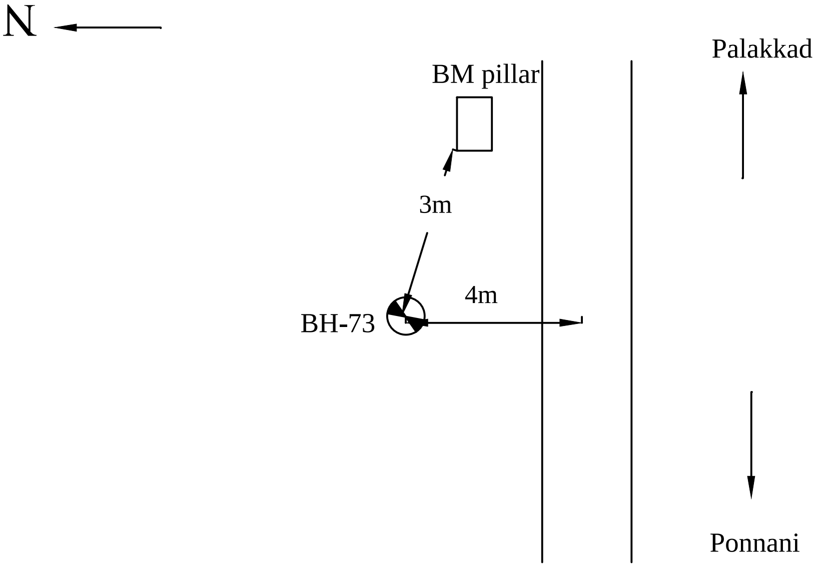
Project: Sub-soil Investigation work for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor

Borehole Location Plan

Borehole No.GT:72



Borehole No.GT:73



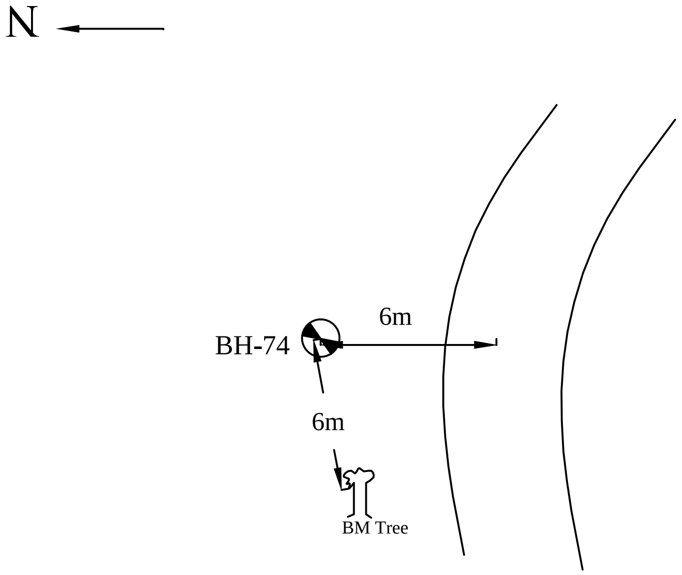
Not to scale

M/s ANAND RAJ INFRATECH PVT. LTD.

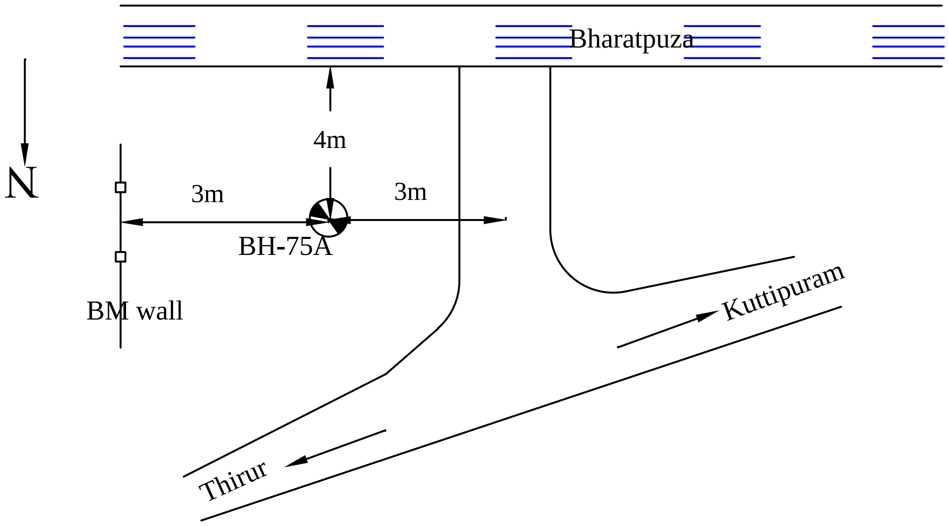
Project: Sub-soil Investigation work for Thiruvananthapuram-
Kasaragod Semi-High-Speed Rail Corridor

Borehole Location Plan

Borehole No.GT:74



Borehole No.GT:75A



Not to scale

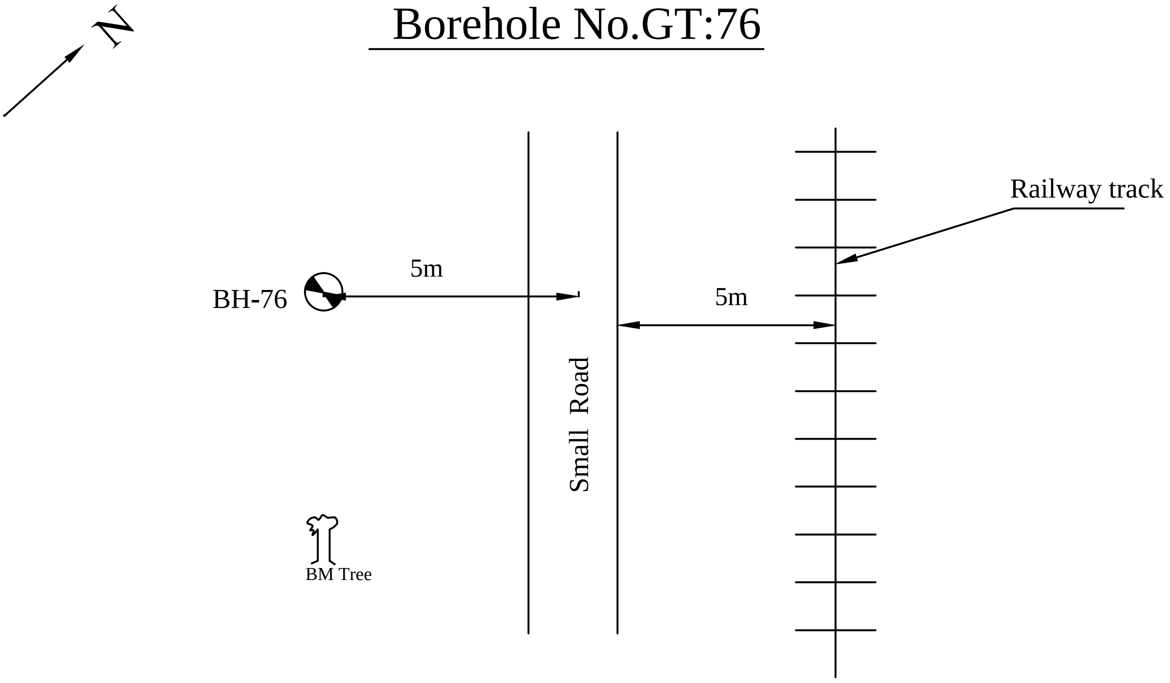
M/s ANAND RAJ INFRATECH PVT. LTD.

Page -

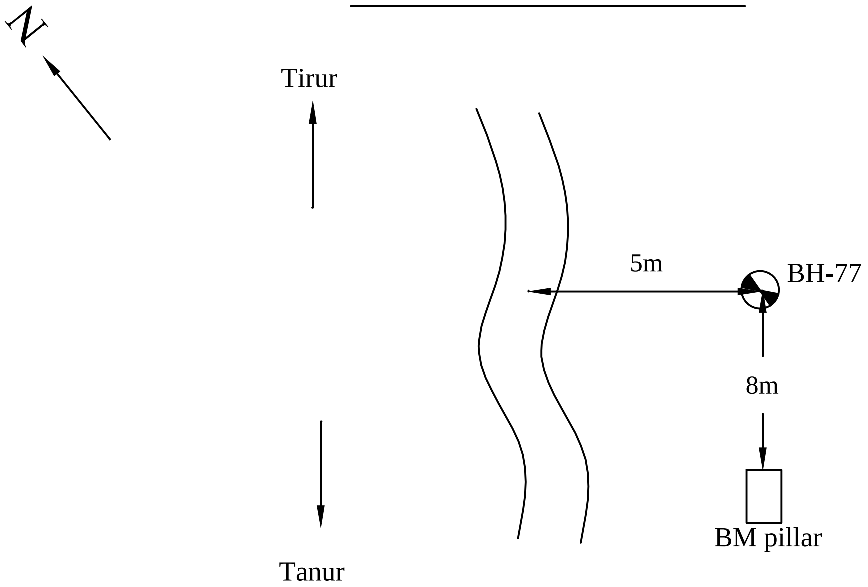
Project: Sub-soil Investigation work for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor

Borehole Location Plan

Borehole No.GT:76



Borehole No.GT:77

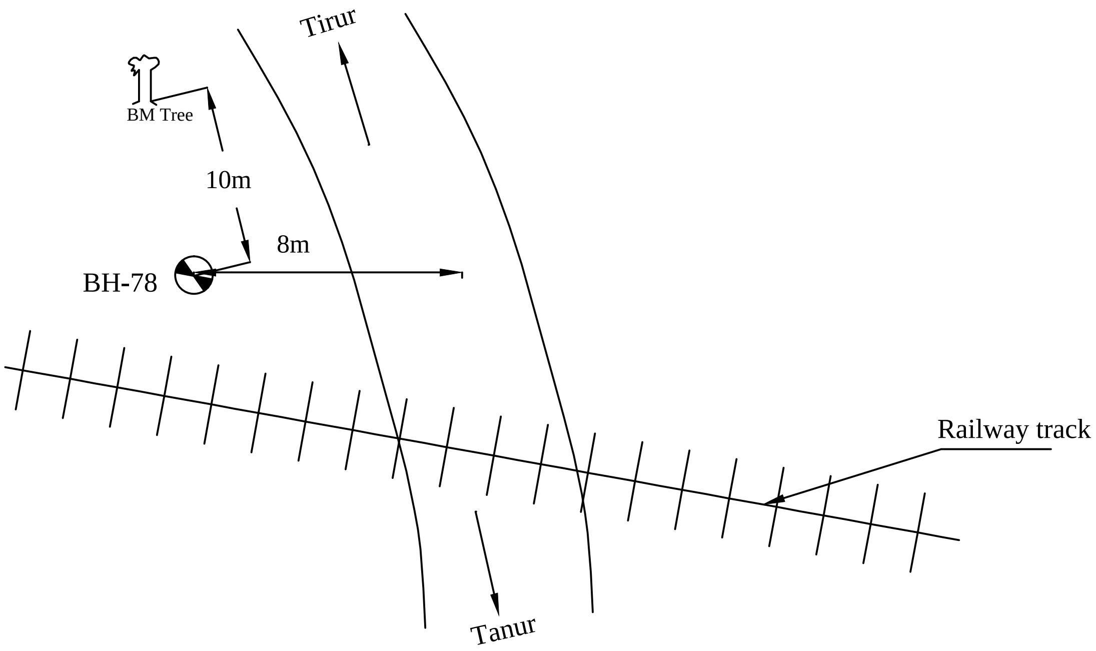


Not to scale	M/s ANAND RAJ INFRATECH PVT. LTD.	Page -

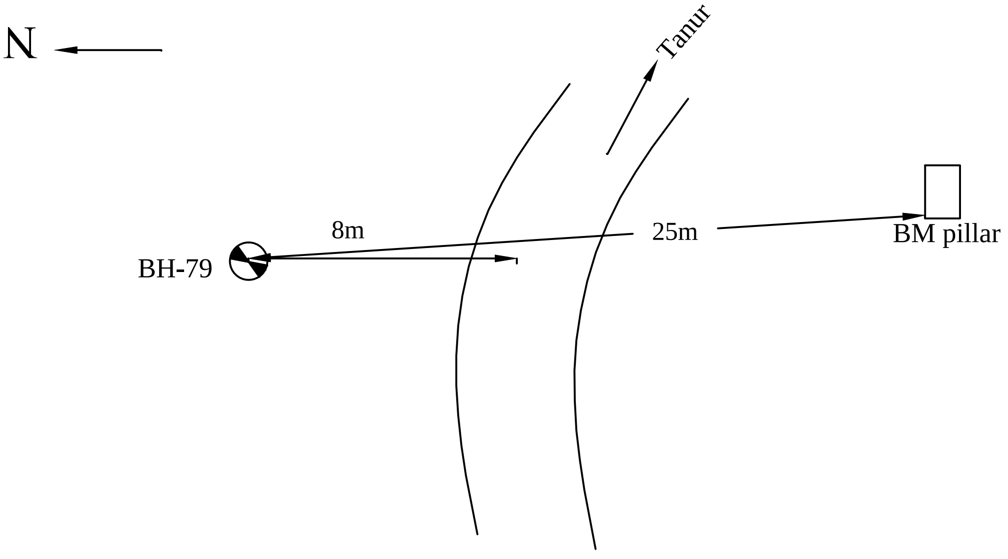
Project: Sub-soil Investigation work for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor

Borehole Location Plan

Borehole No.GT:78



Borehole No.GT:79

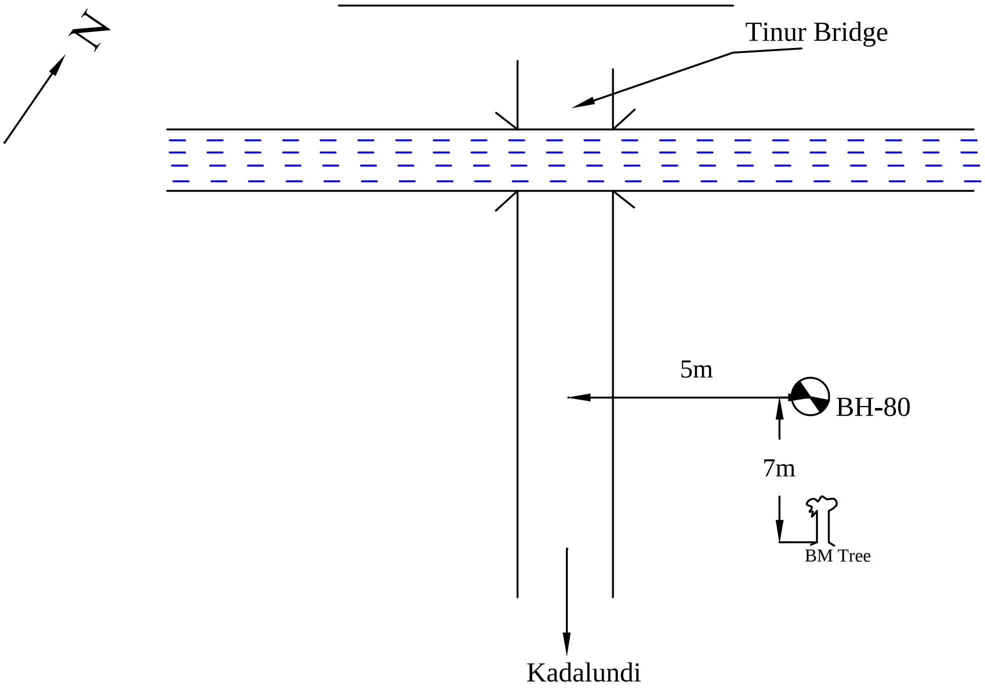


Not to scale	M/s ANAND RAJ INFRATECH PVT. LTD.	Page -

Project: Sub-soil Investigation work for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor

Borehole Location Plan

Borehole No.GT:80



Not to scale

M/s ANAND RAJ INFRATECH PVT. LTD.

Page -

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 81

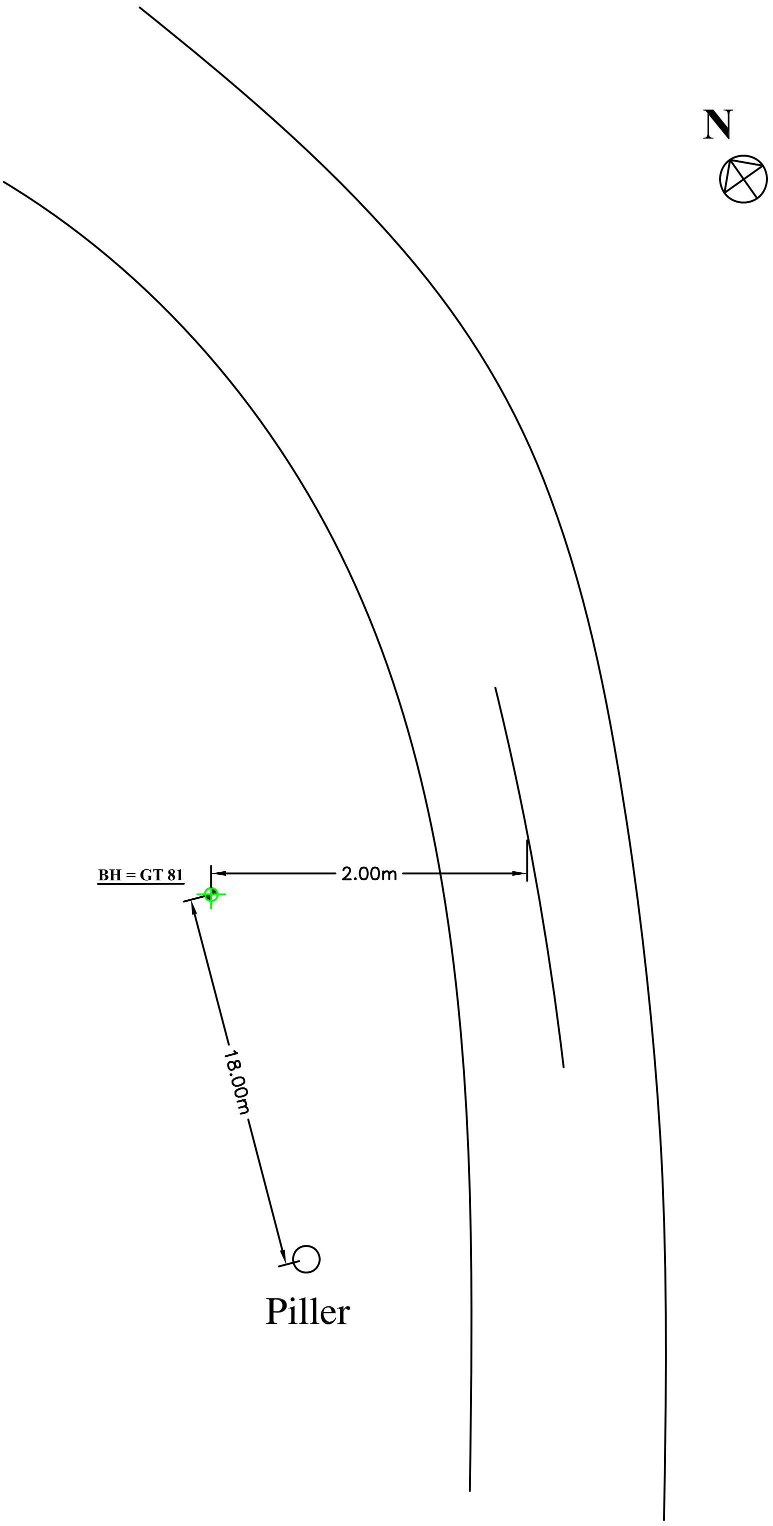


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 82

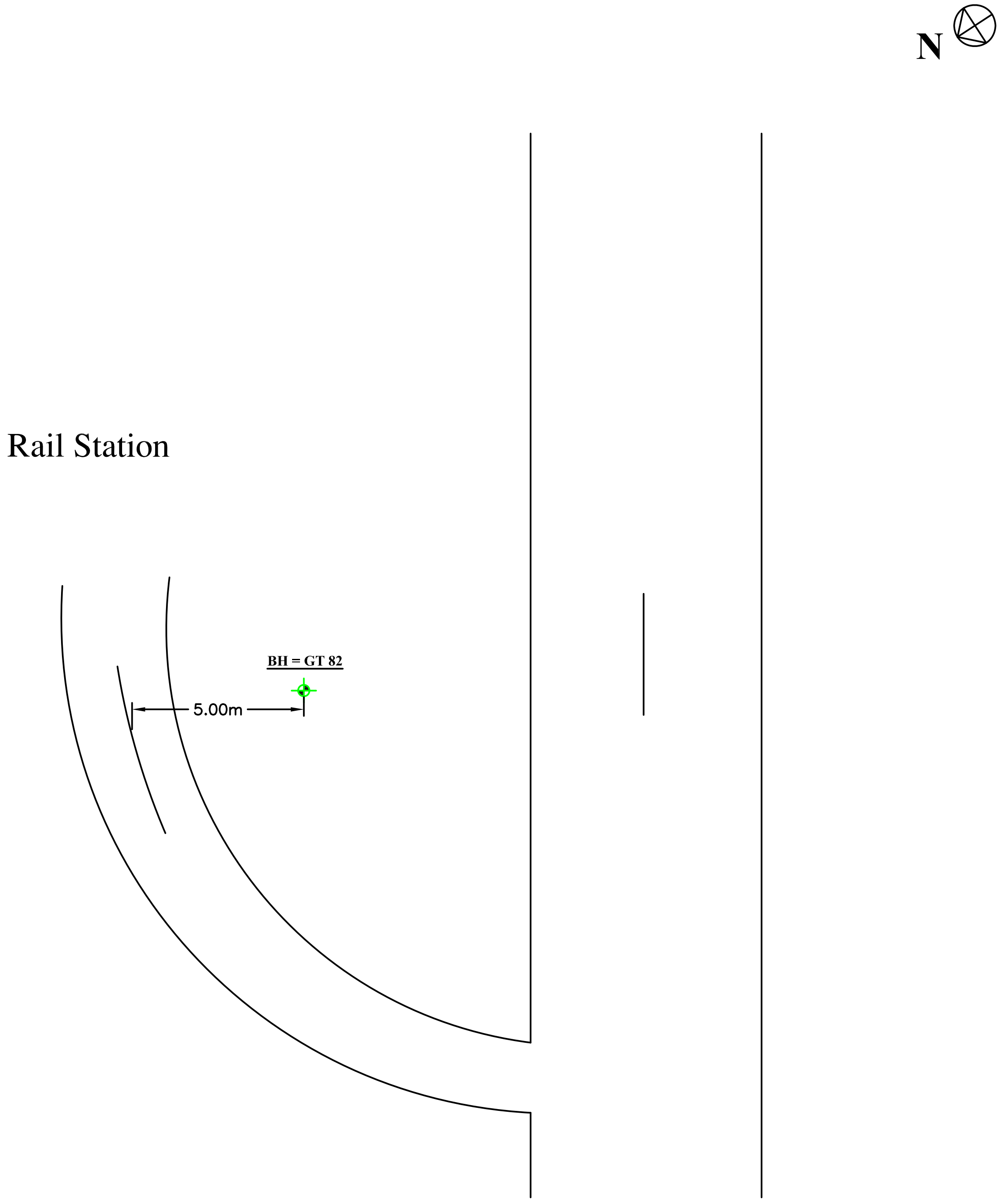


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 83

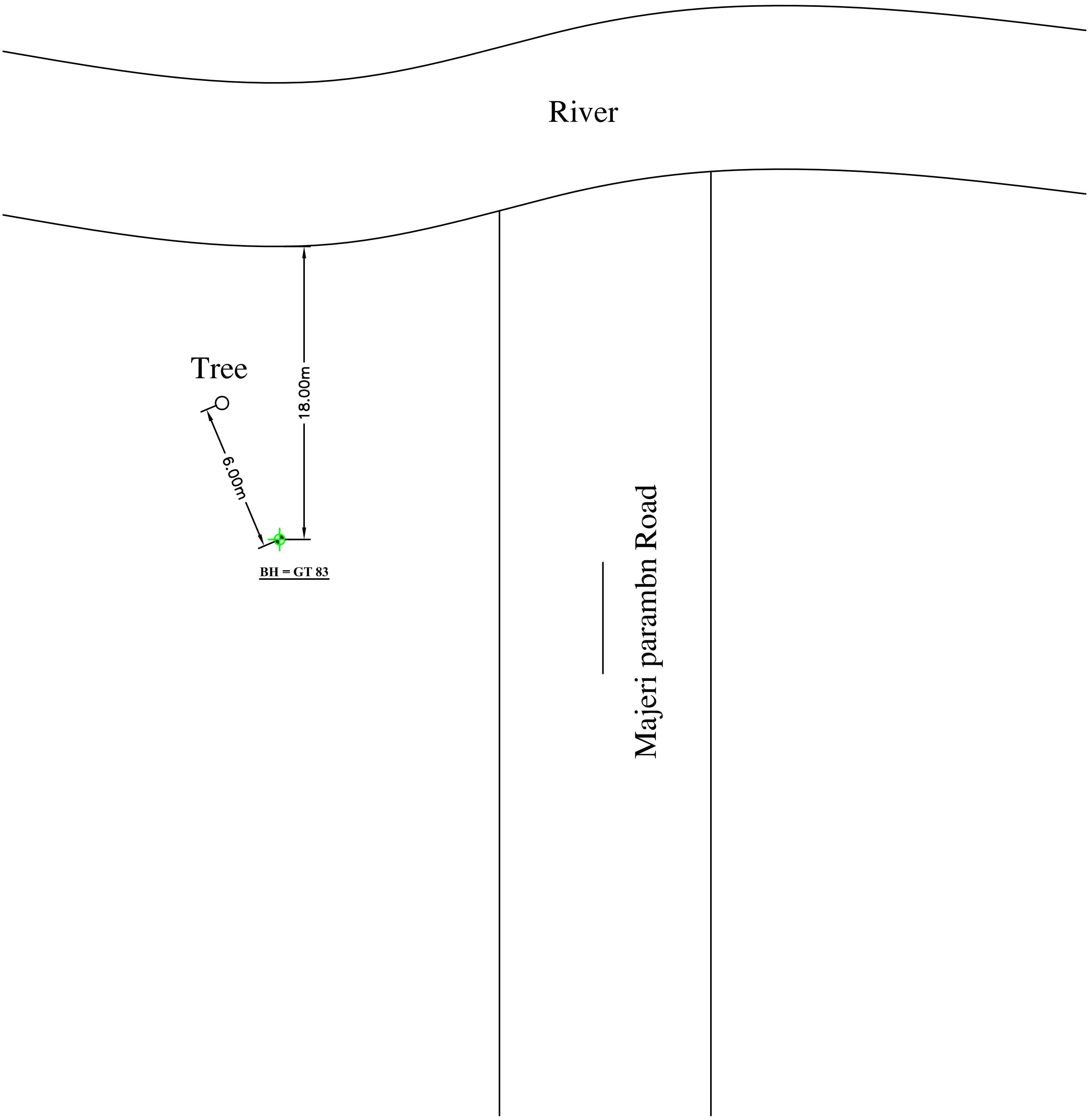


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 84

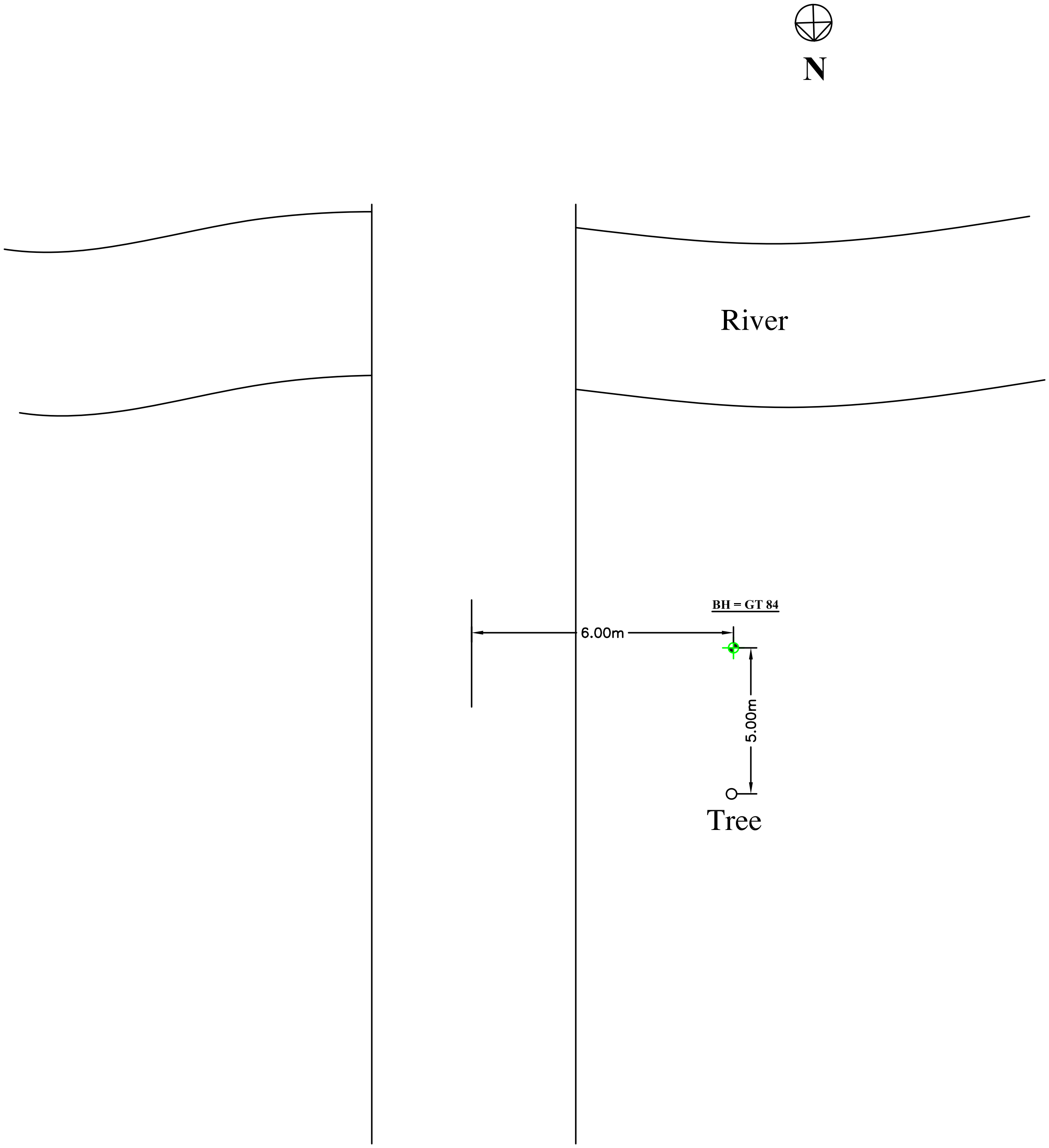


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 85

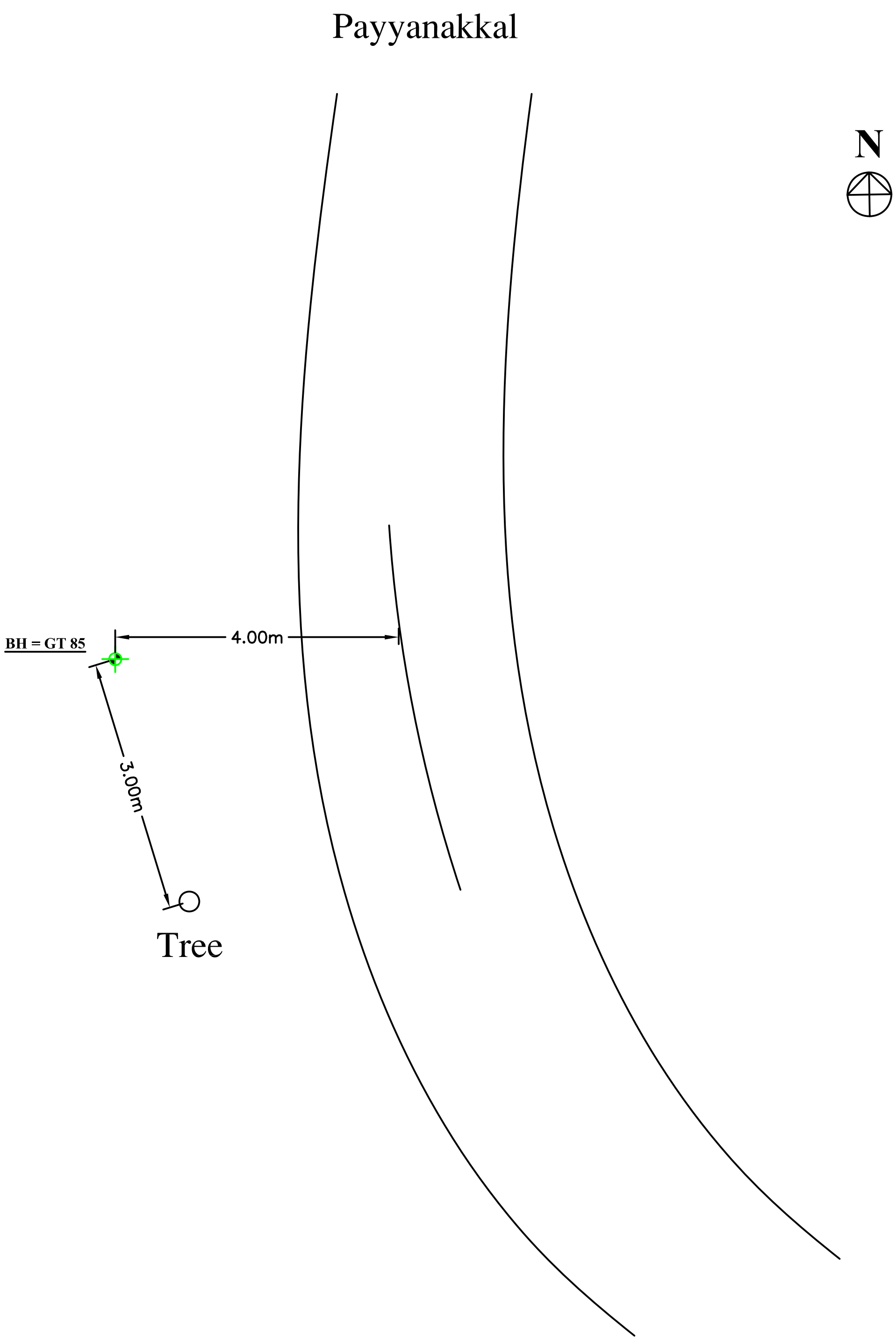


Figure1: Borehole Location Plane

Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 86

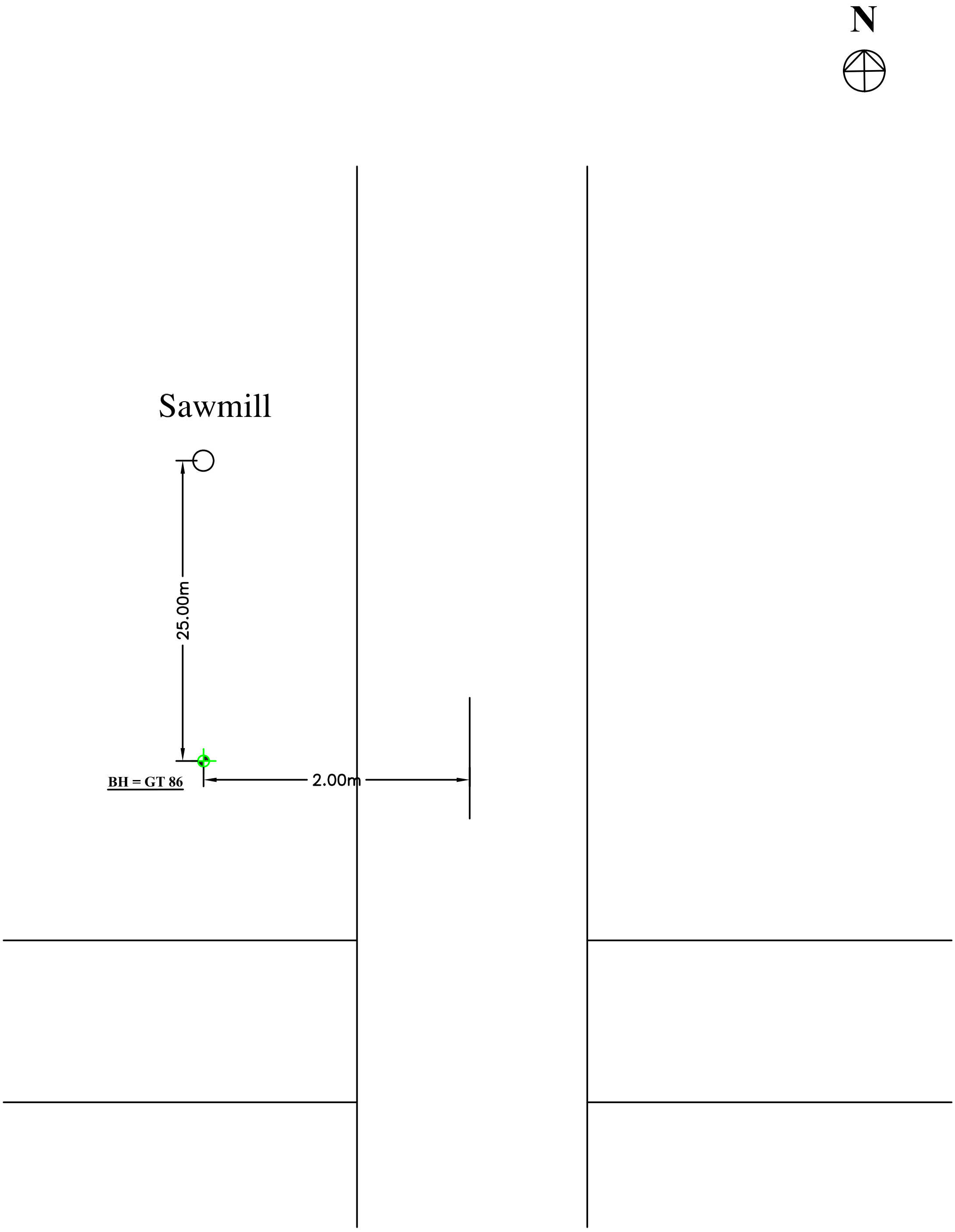


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 86A

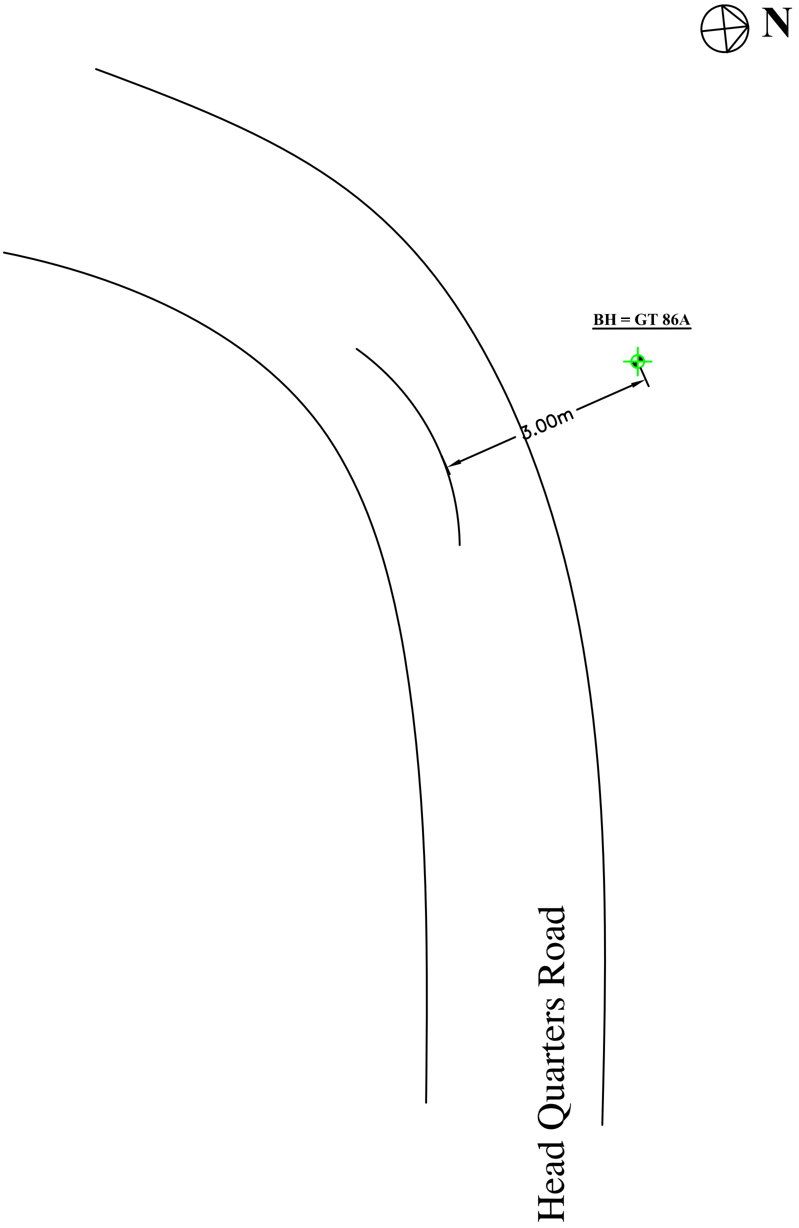


Figure1: Borehole Location Plane

Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 87

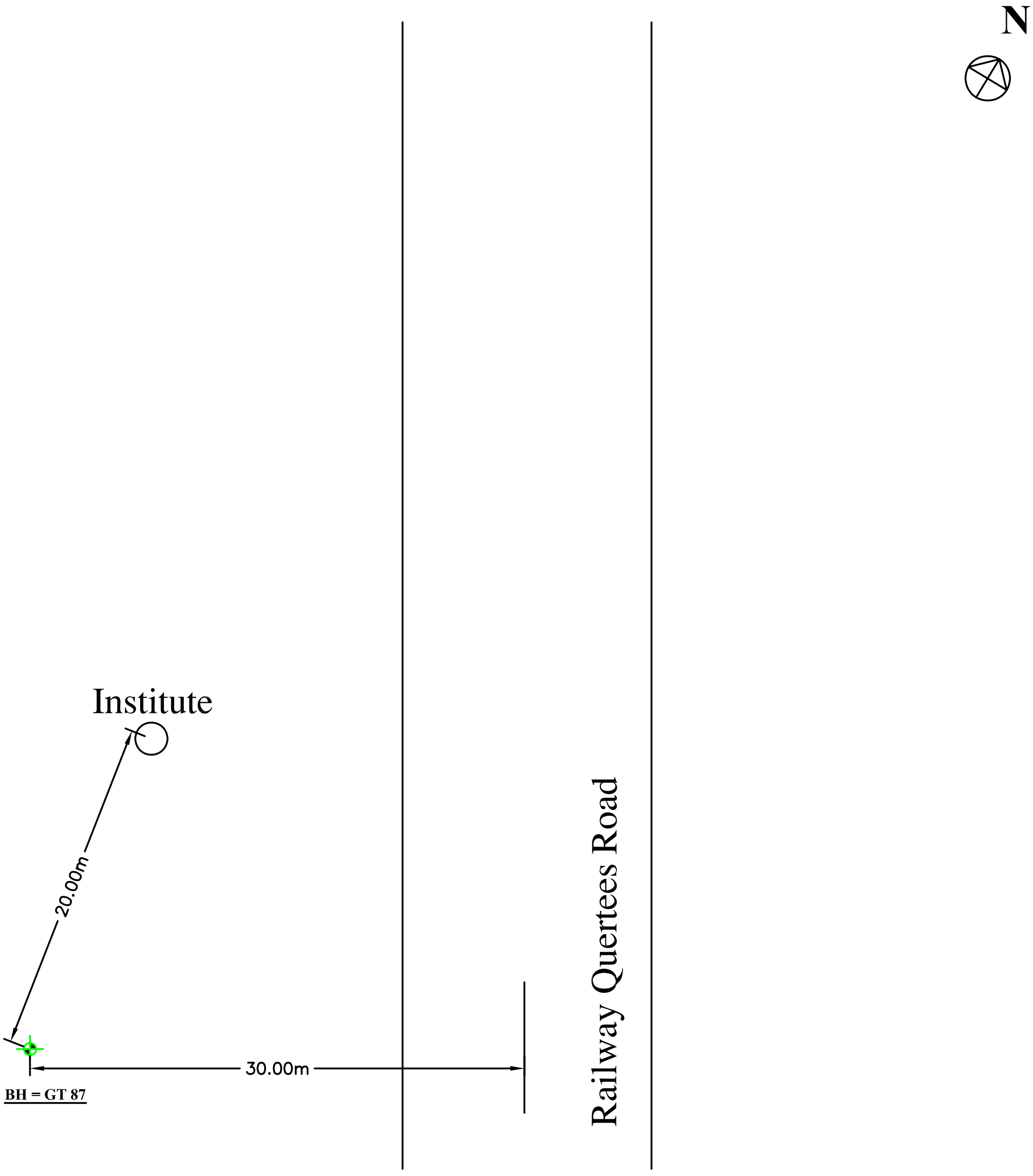


Figure1: Borehole Location Plane

Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 87A

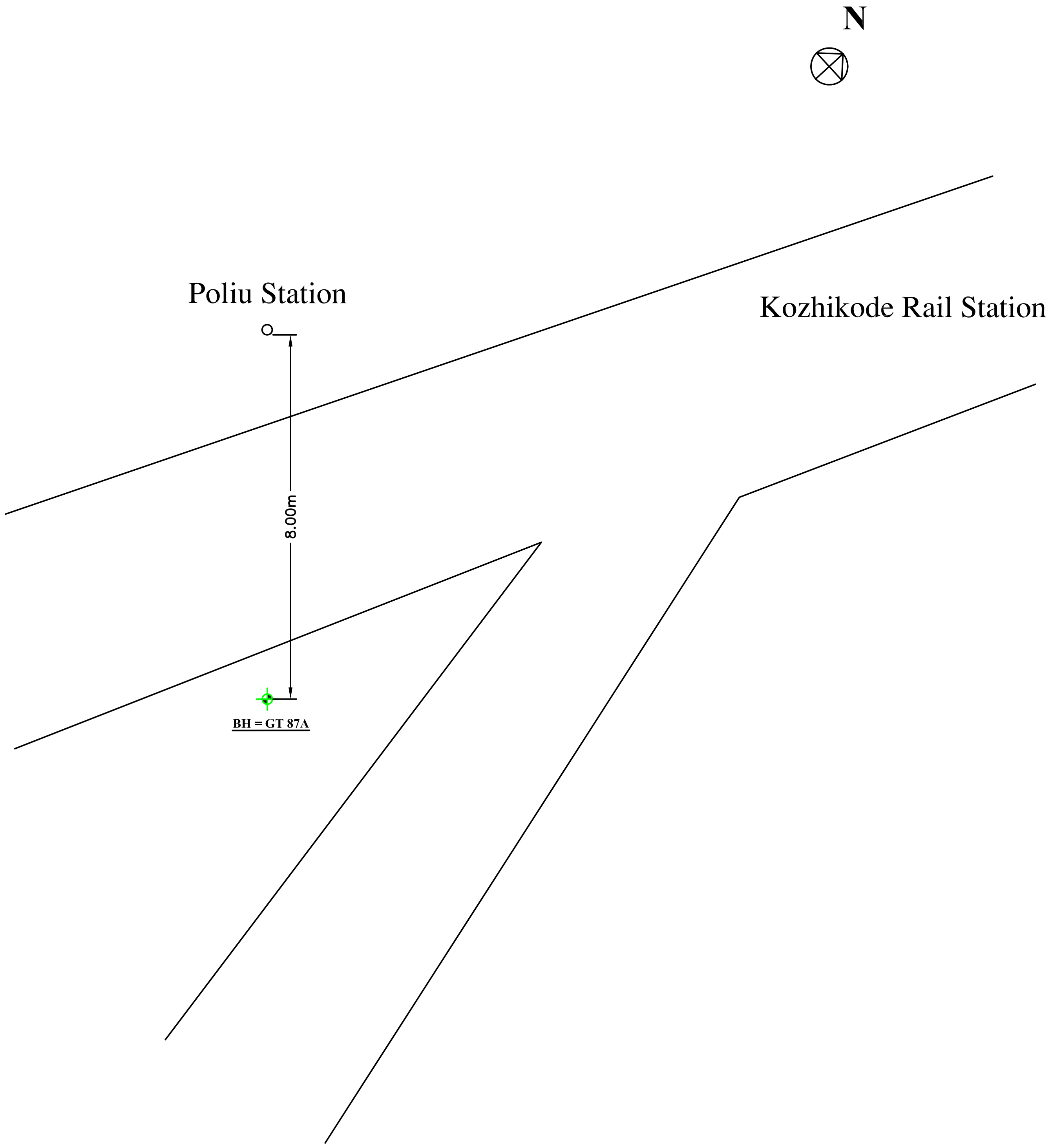


Figure1: Borehole Location Plane

Not to Scale

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 88

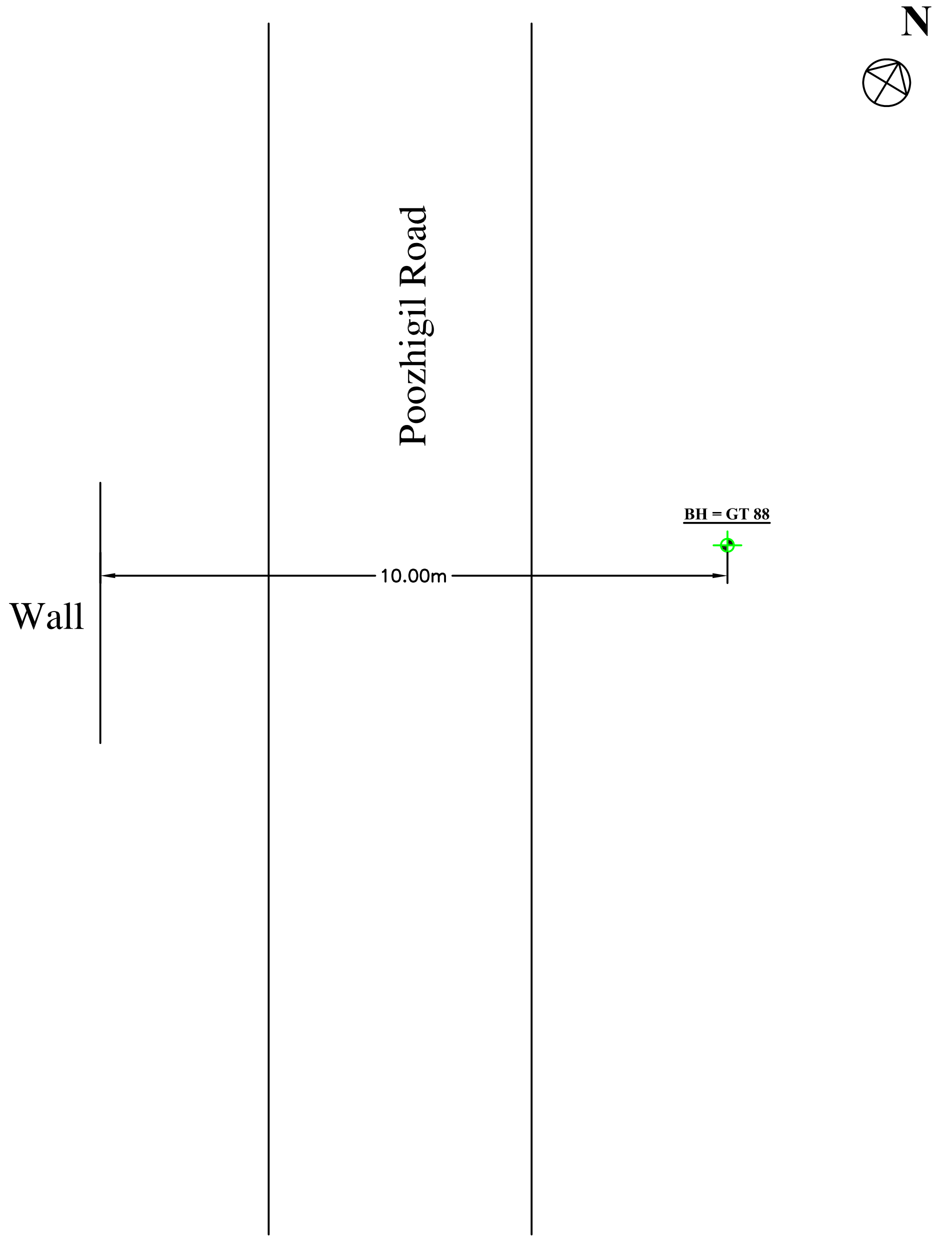


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 89

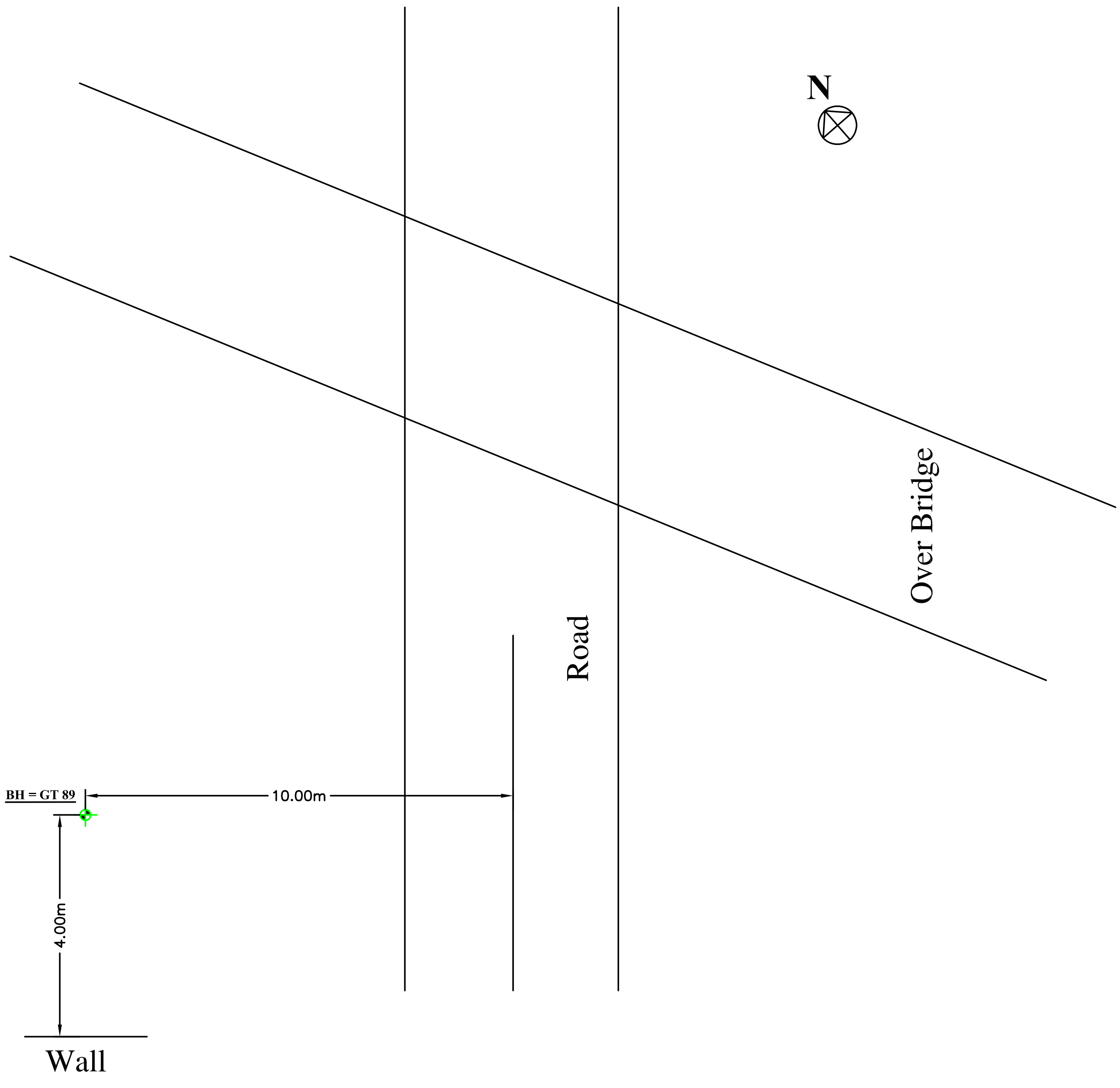


Figure1: Borehole Location Plane

Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 90

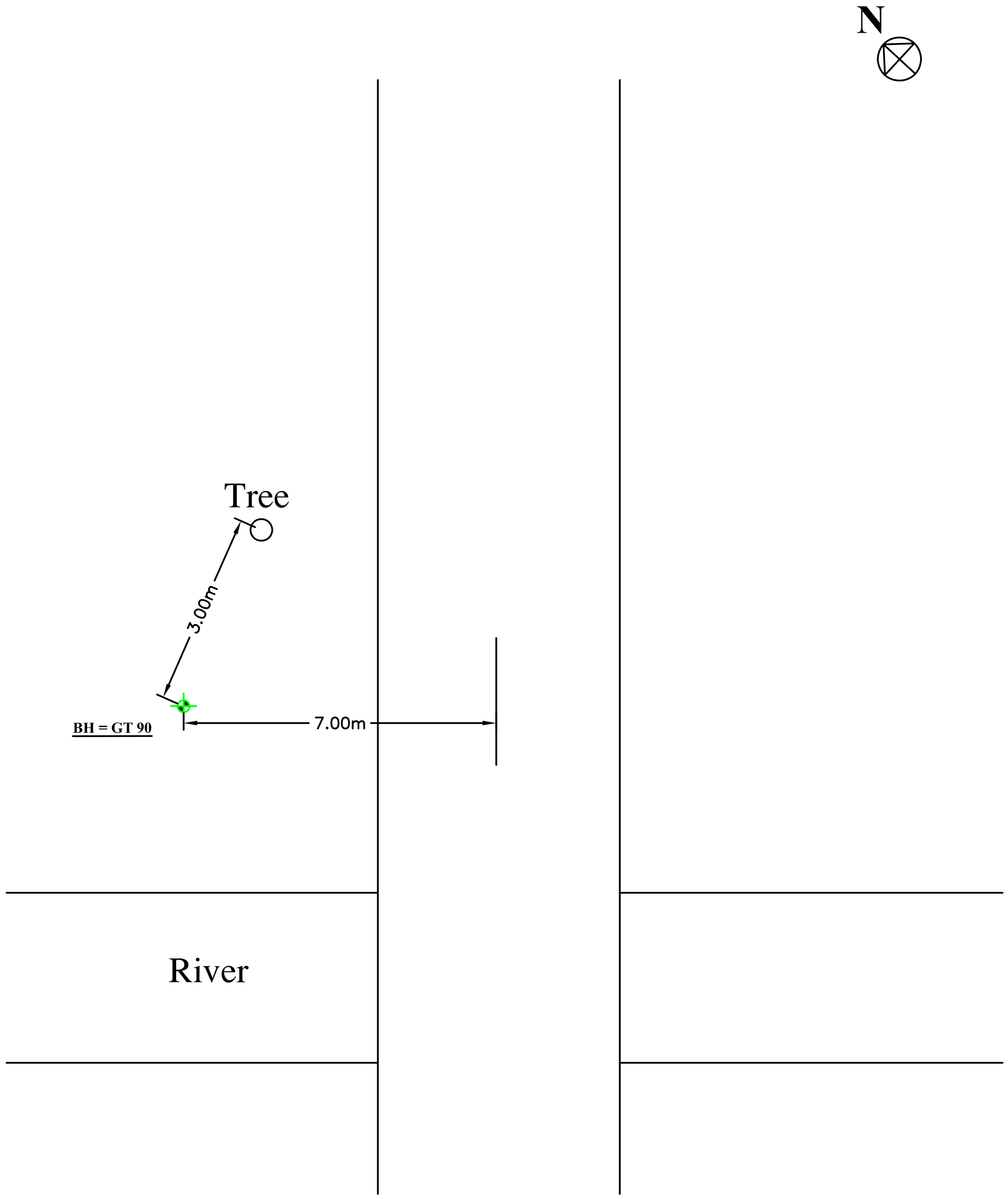


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 91

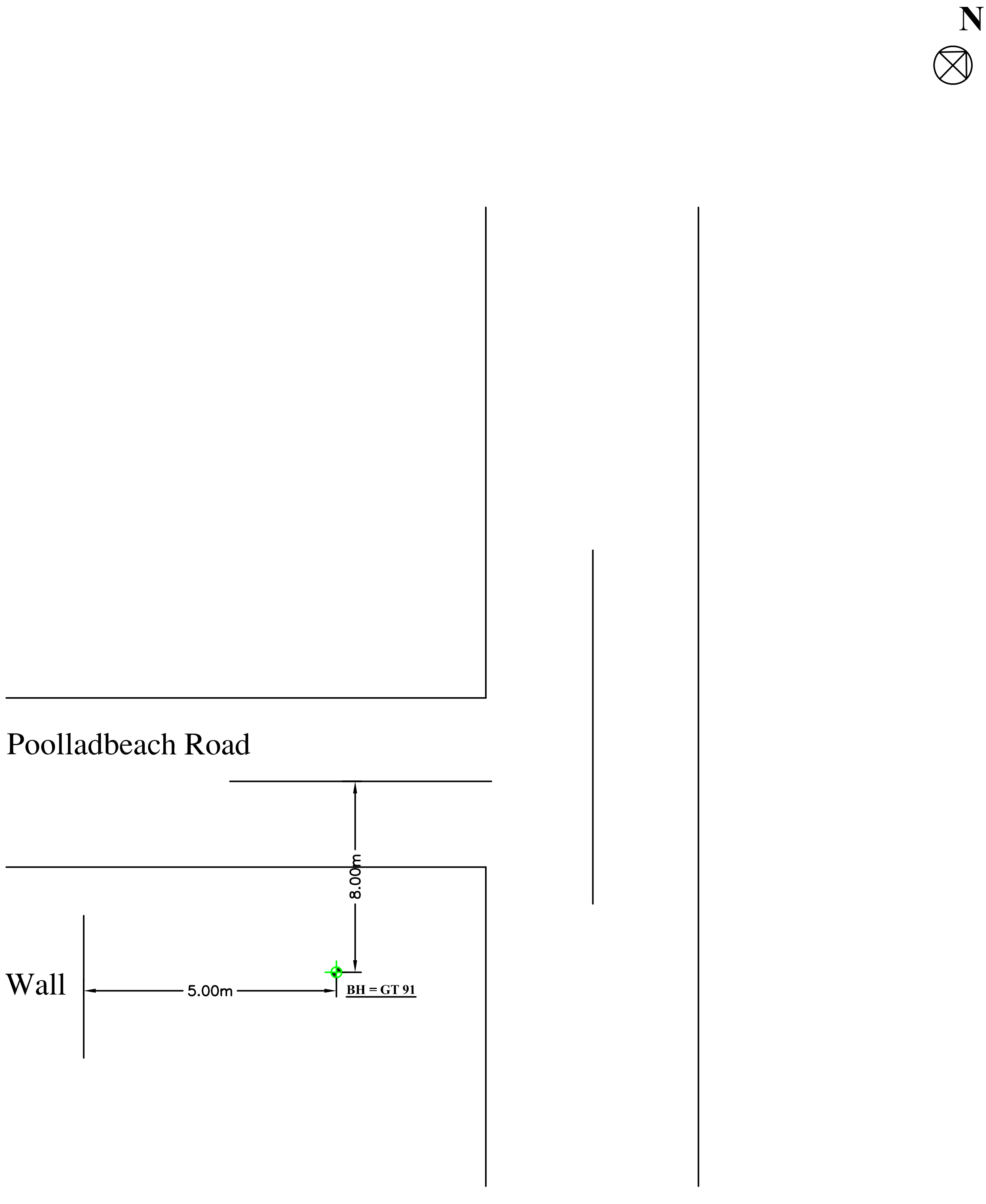


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 92

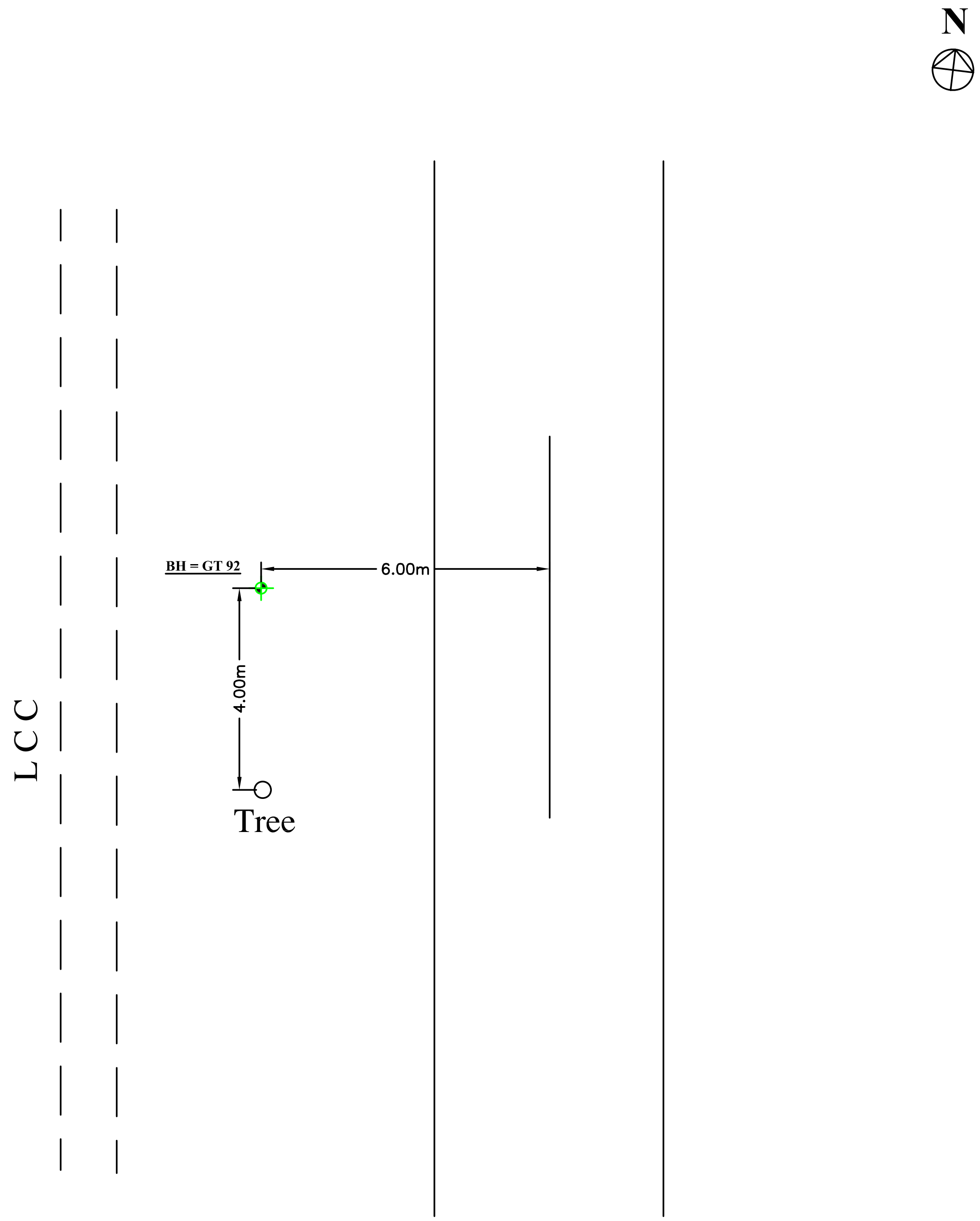


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 93

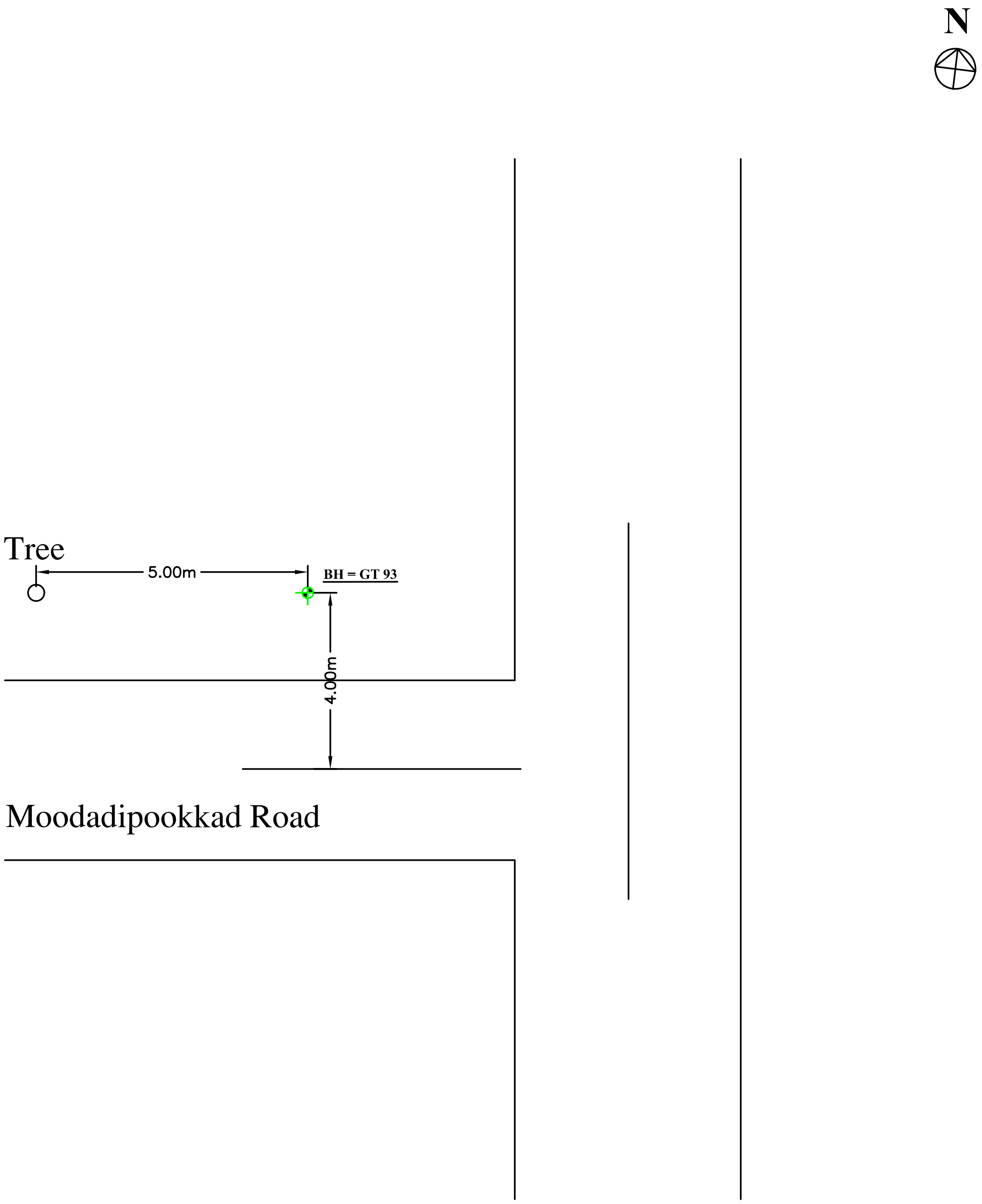


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 94

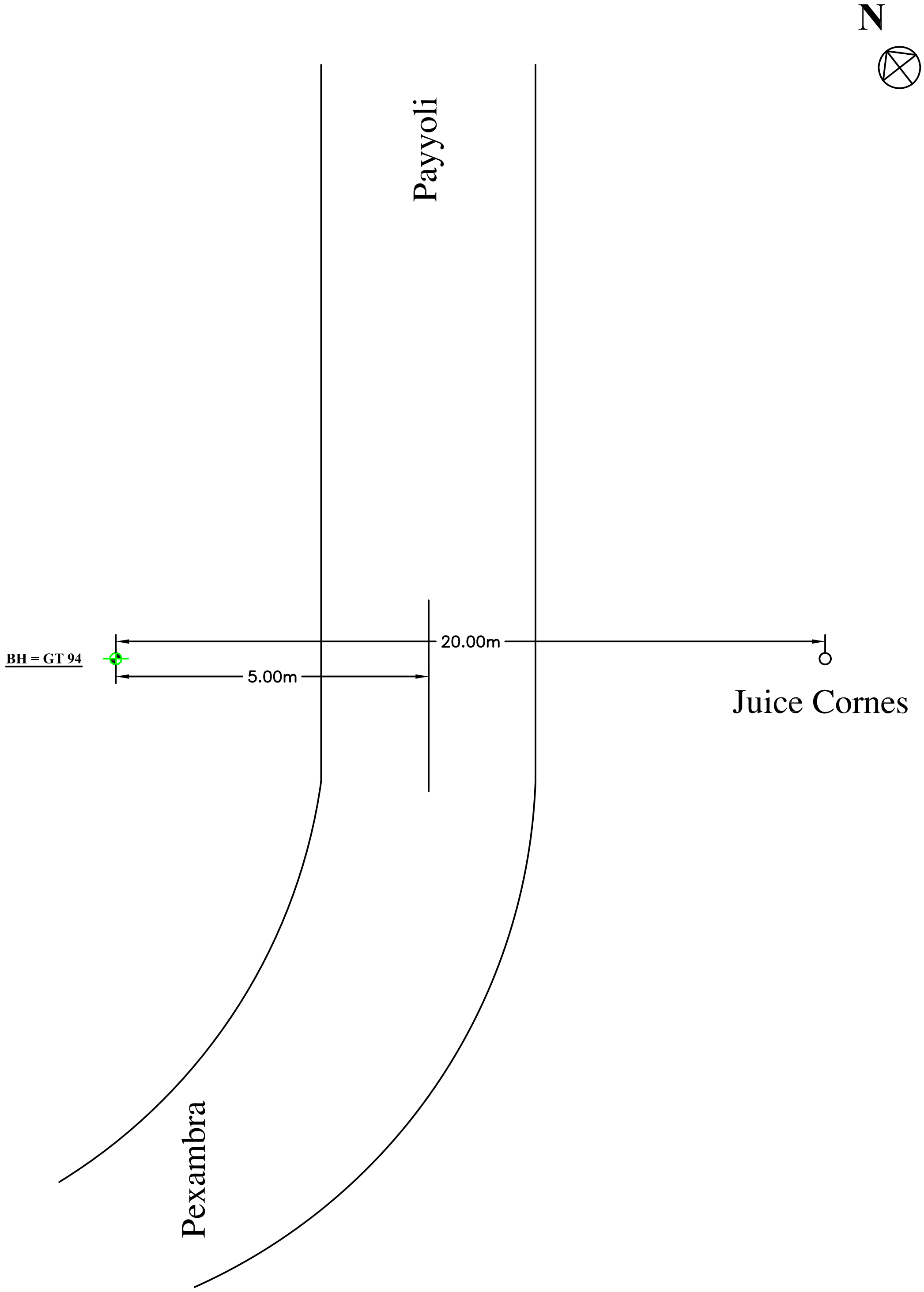


Figure1: Borehole Location Plane

Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 95

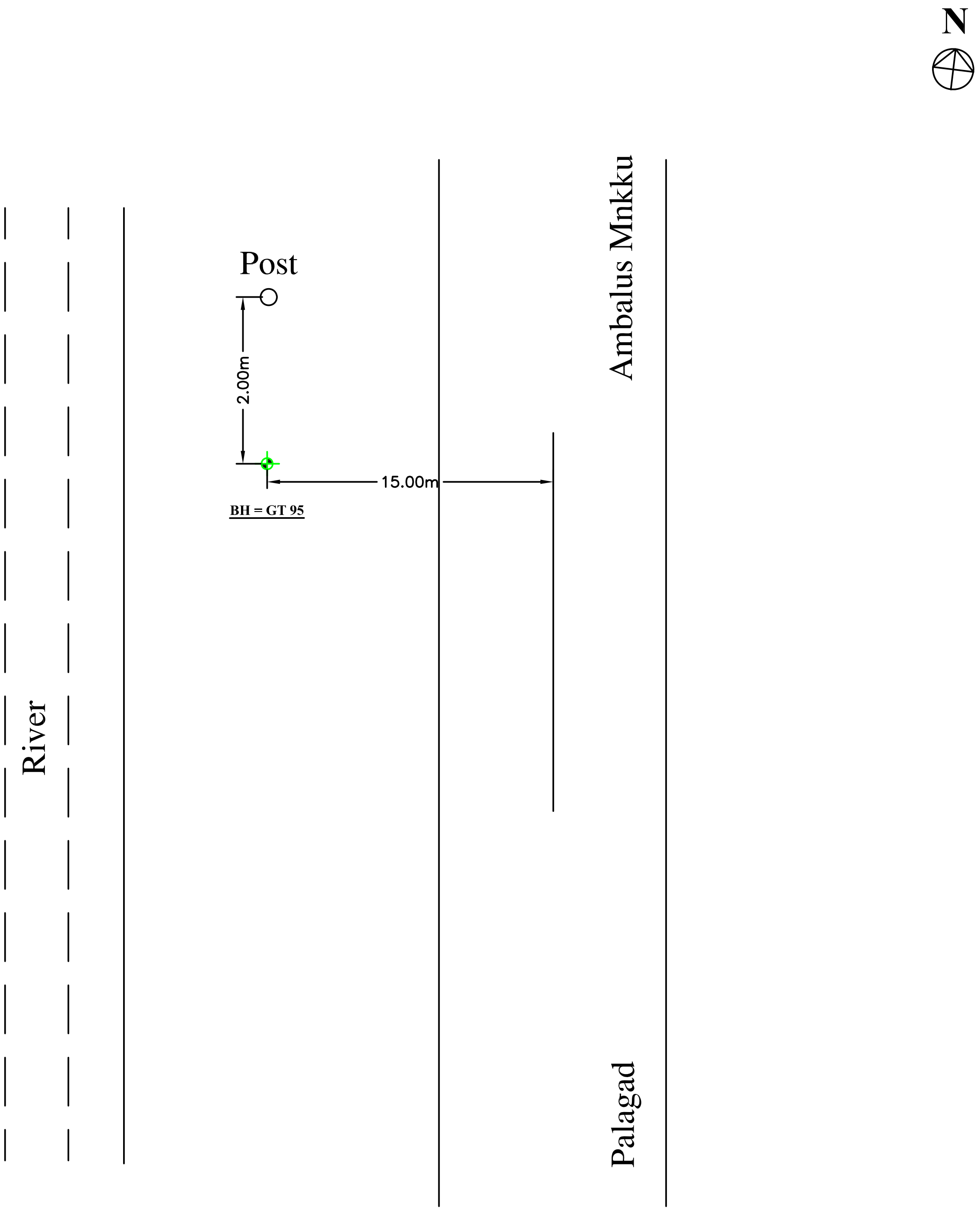


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 96

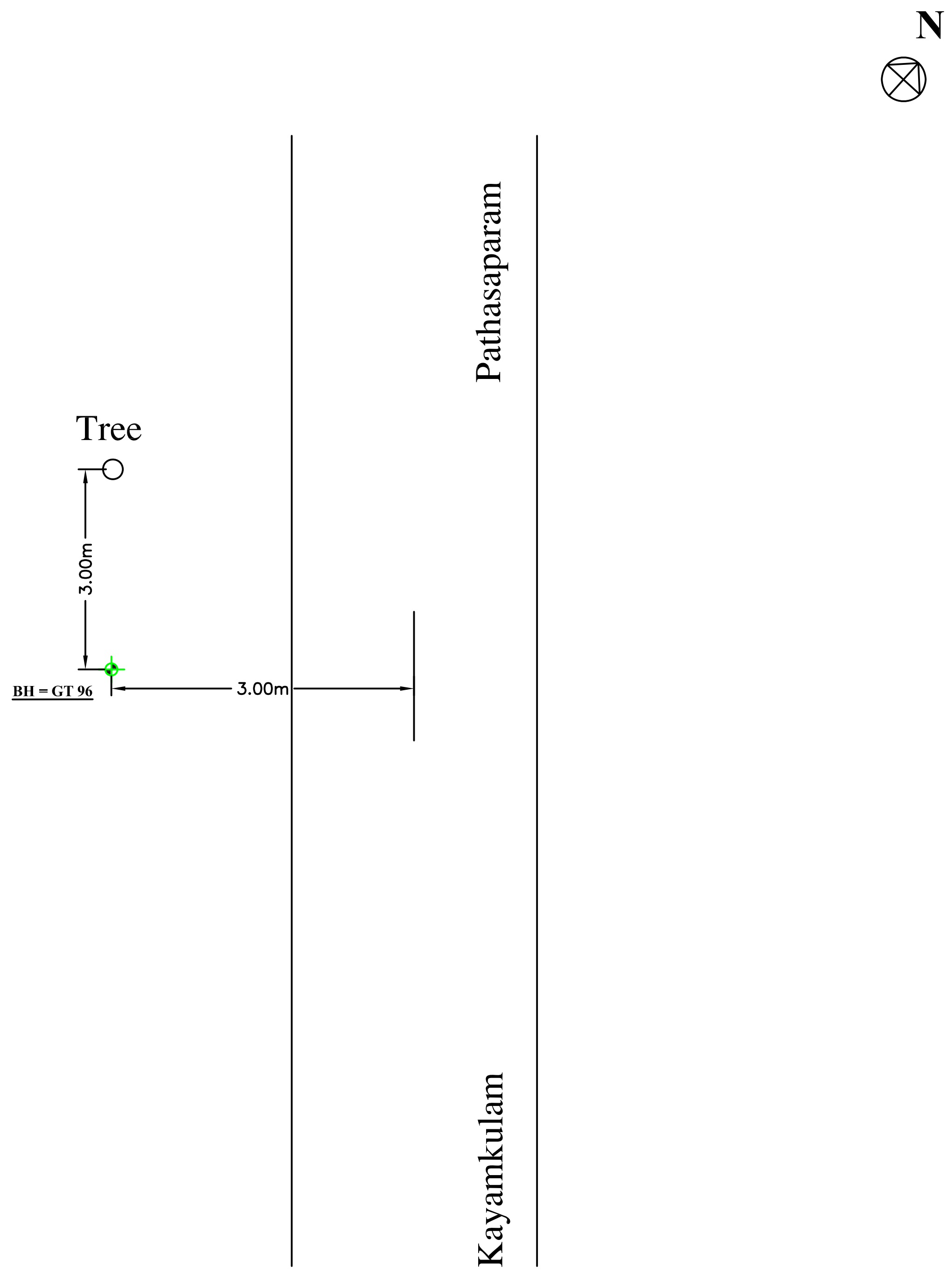


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 97

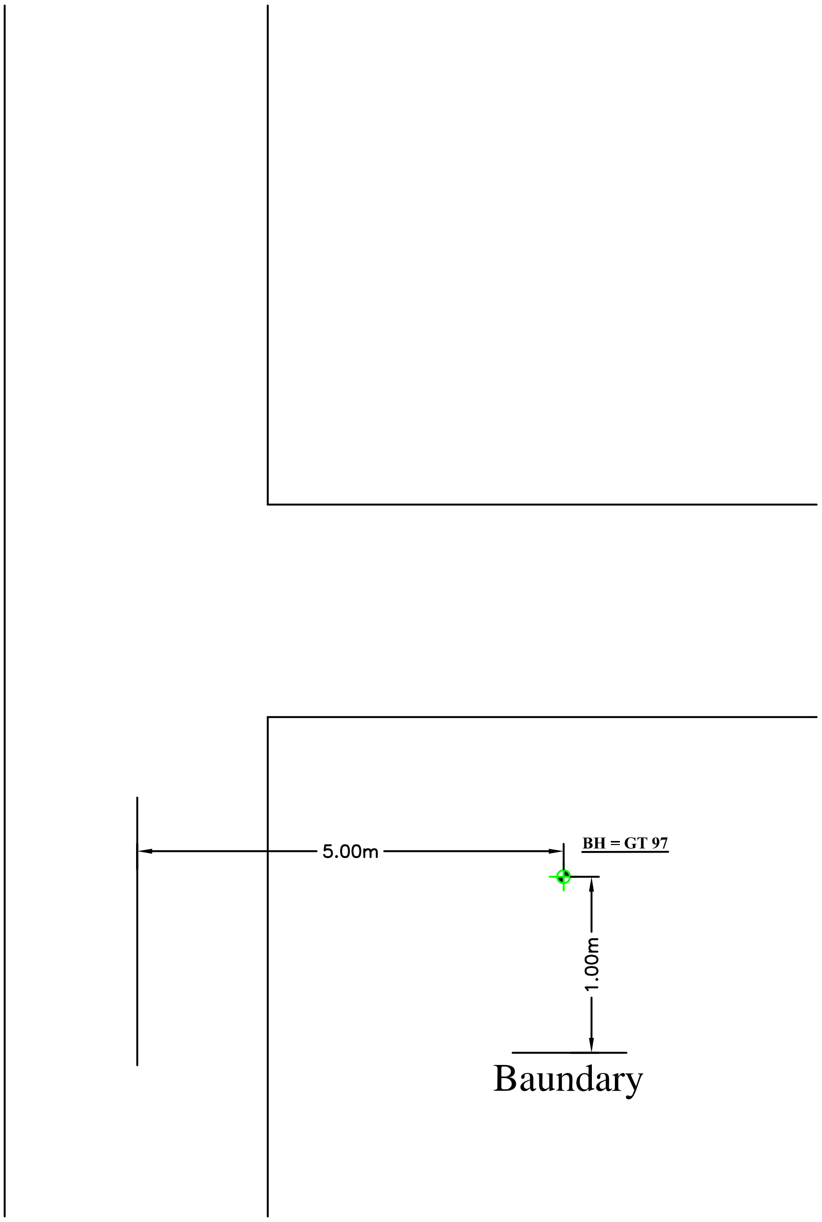


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 98

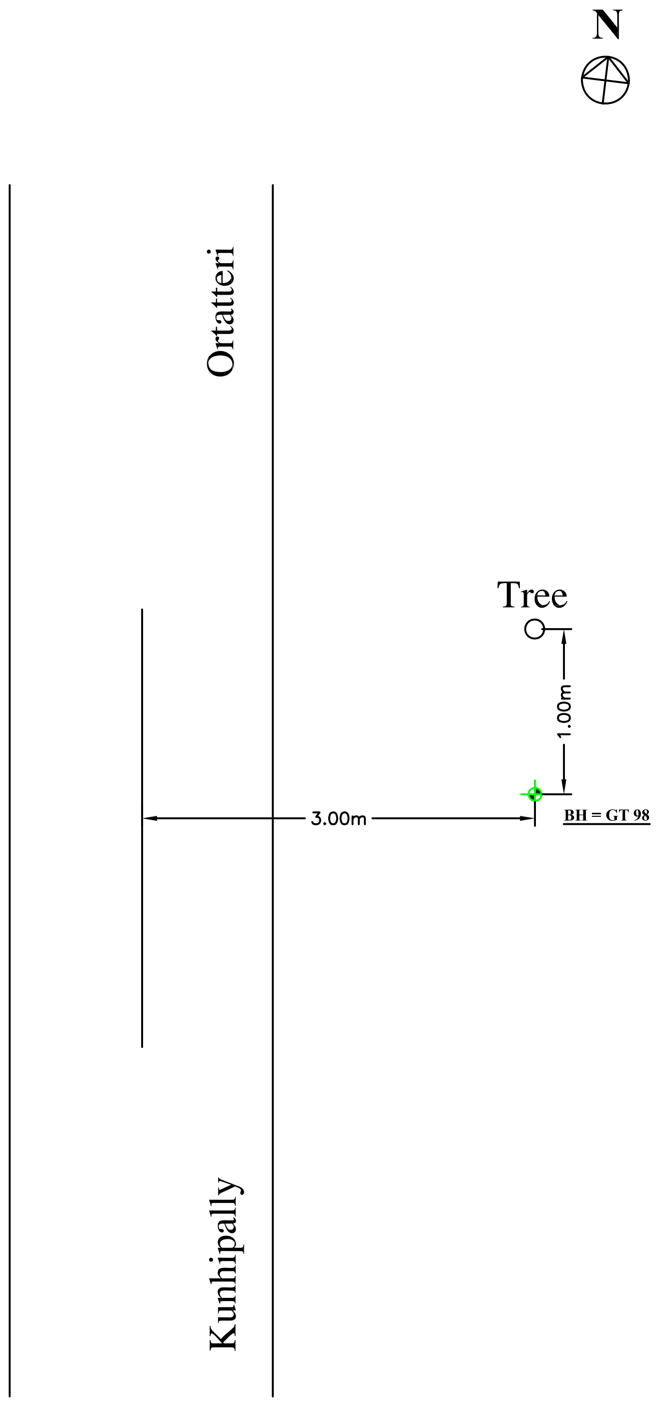


Figure1: Borehole Location Plane
Not to Scale

M/S ANAND RAJ INFRATECH PVT. LTD.

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

BH = GT 99

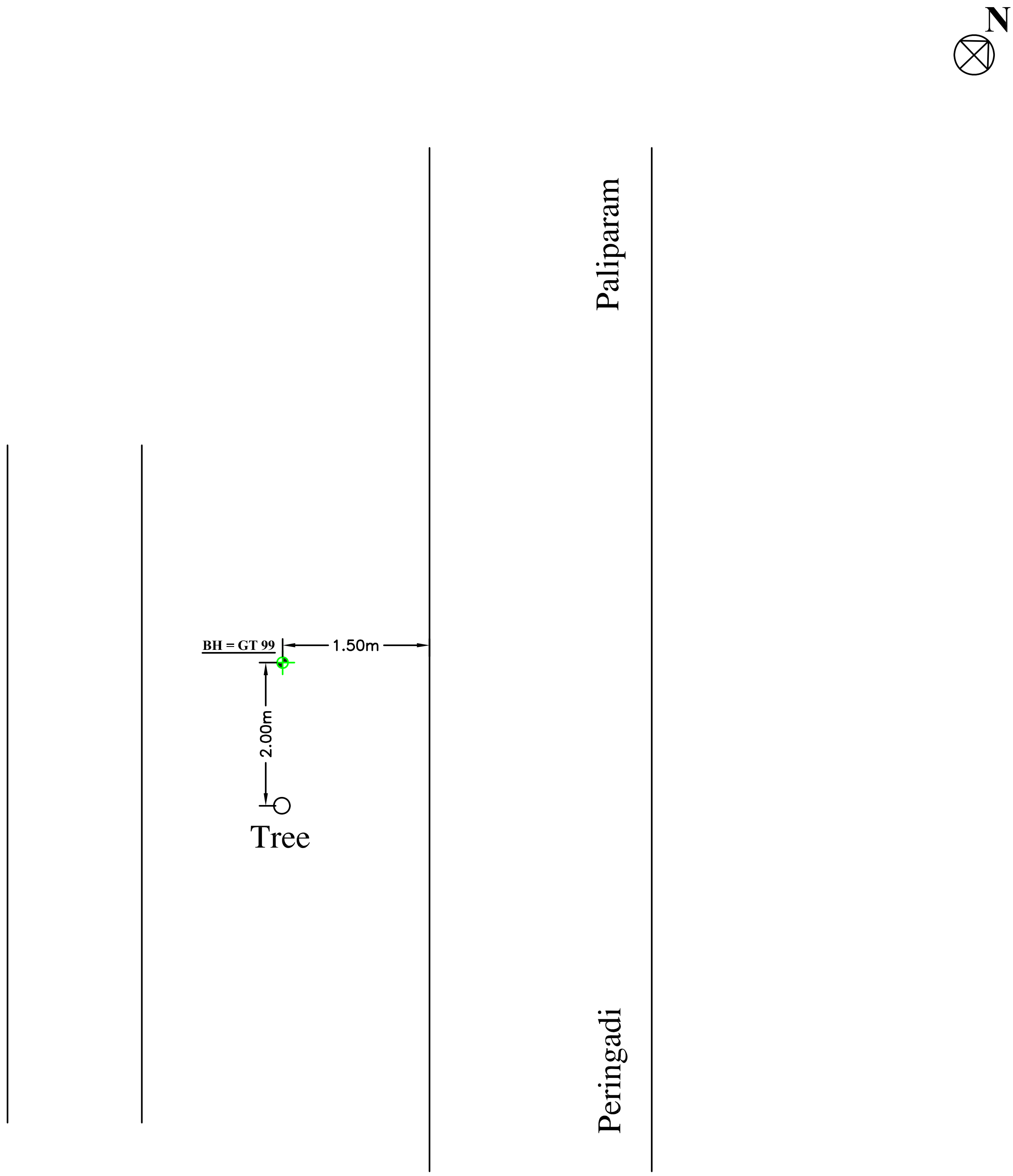
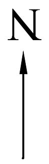


Figure1: Borehole Location Plane

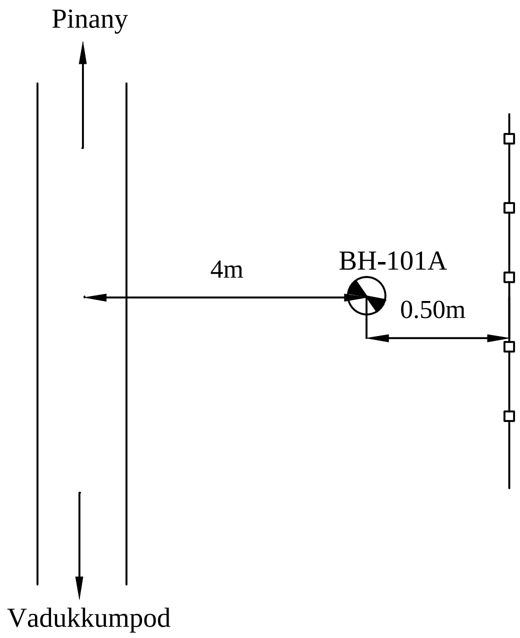
Not to Scale

Project: Sub-soil Investigation work for Thiruvananthapuram-
Kasaragod Semi-High-Speed Rail Corridor

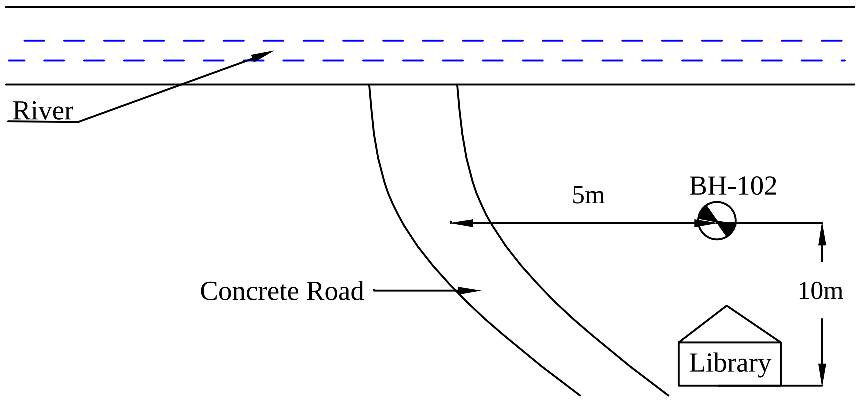
Borehole Location Plan



Borehole No.GT:101A



Borehole No.GT:102

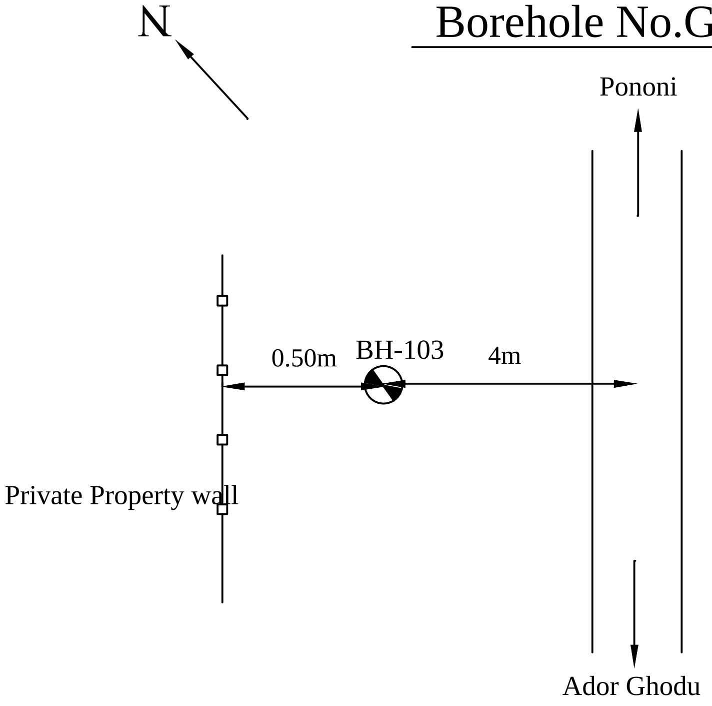


Not to scale	M/s ANAND RAJ INFRATECH PVT. LTD.	Page -

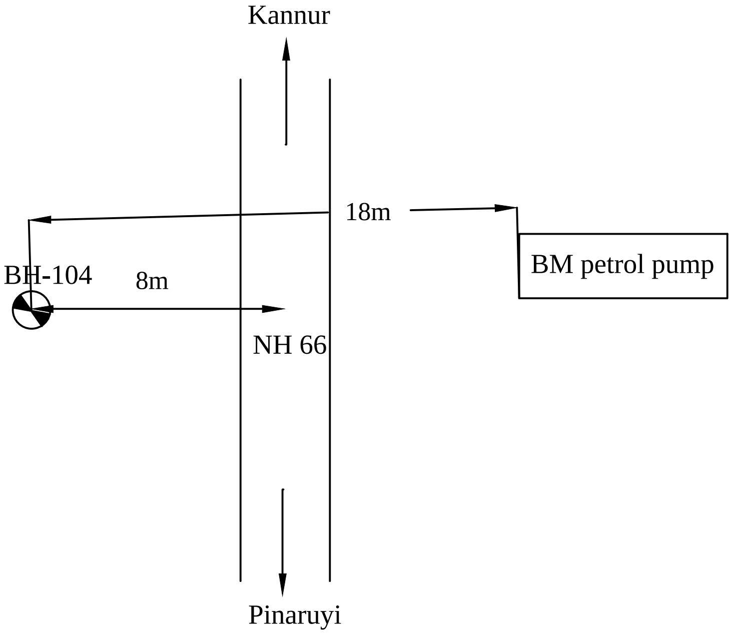
Project: Sub-soil Investigation work for Thiruvananthapuram-
Kasaragod Semi-High-Speed Rail Corridor

Borehole Location Plan

Borehole No.GT:103



Borehole No.GT:104



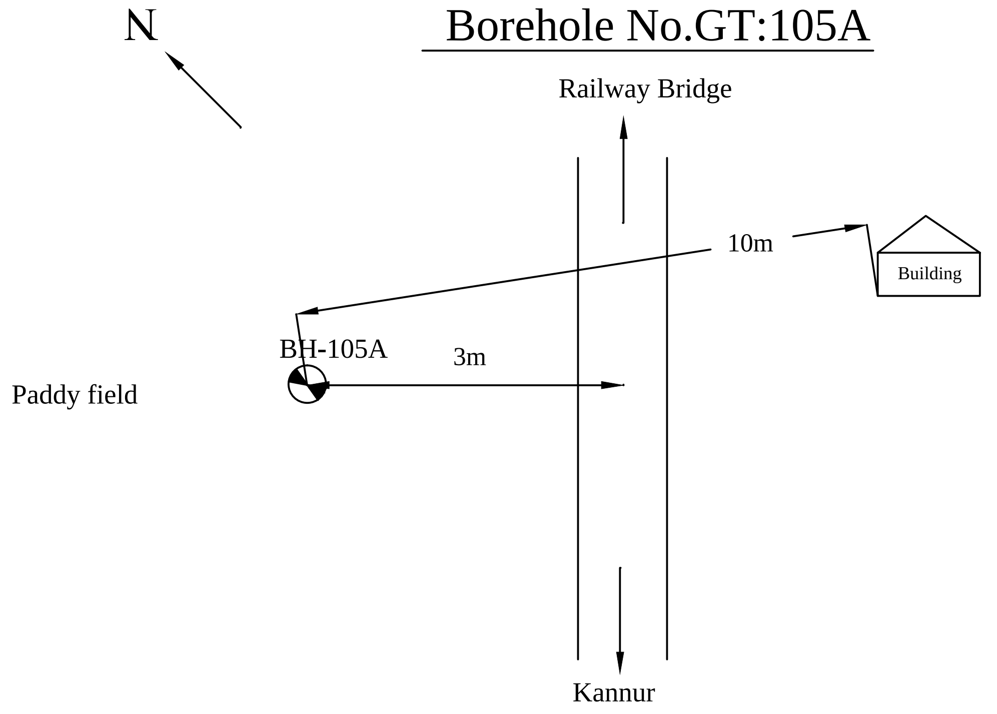
Not to scale

M/s ANAND RAJ INFRATECH PVT. LTD.

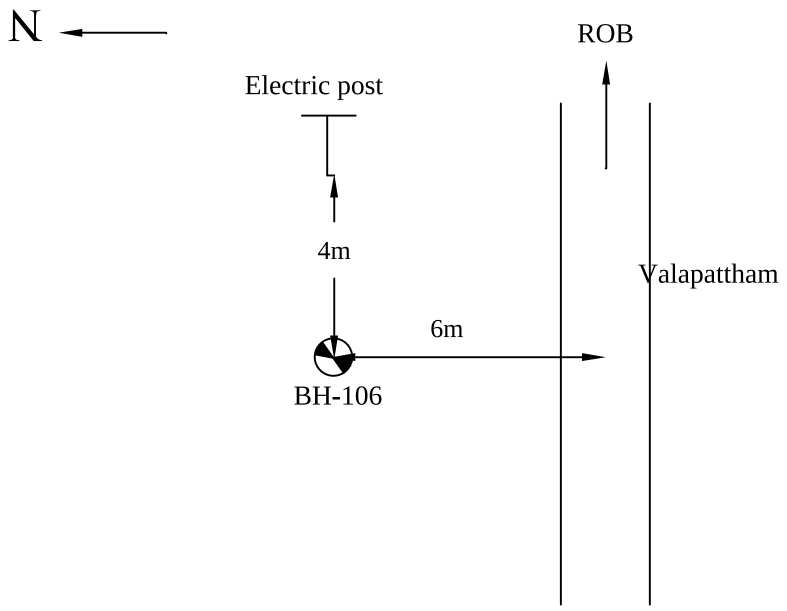
Project: Sub-soil Investigation work for Thiruvananthapuram-
Kasaragod Semi-High-Speed Rail Corridor

Borehole Location Plan

Borehole No.GT:105A



Borehole No.GT:106

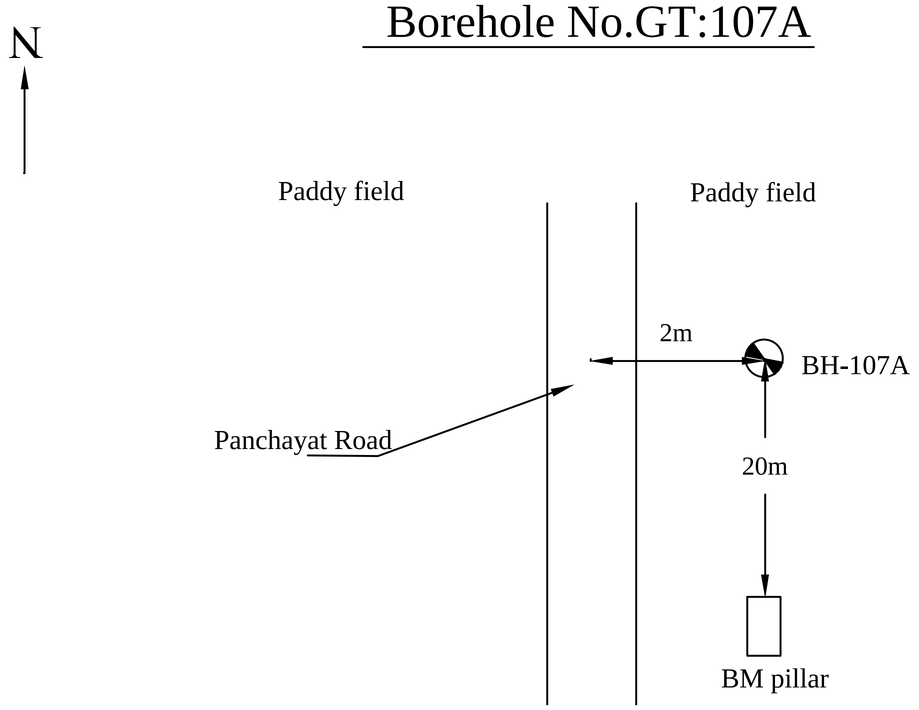


Not to scale	M/s ANAND RAJ INFRATECH PVT. LTD.	Page -

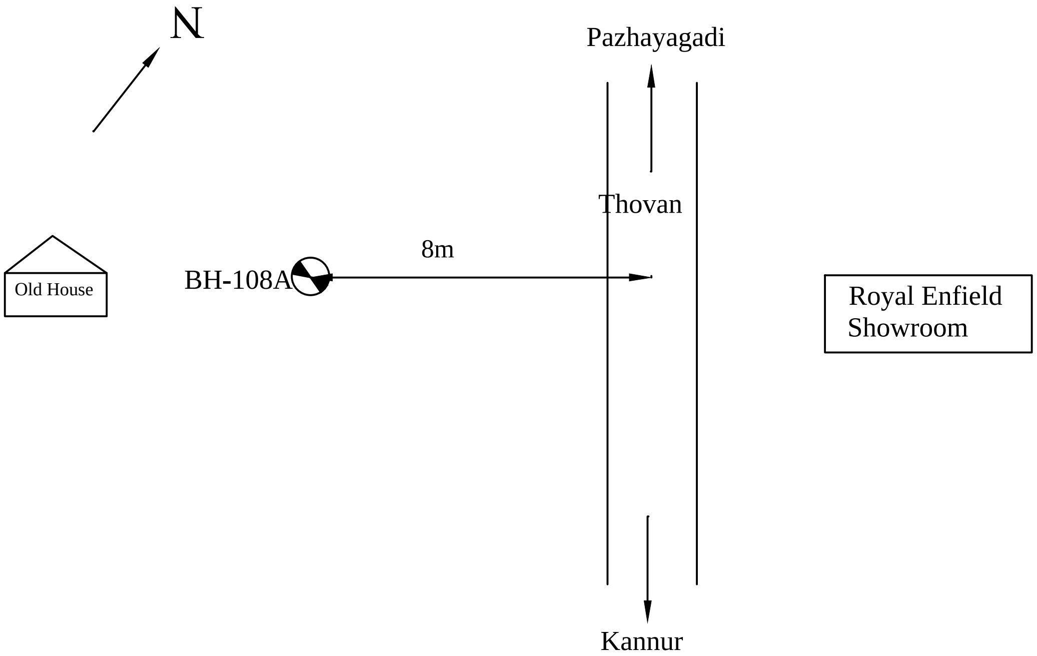
Project: Sub-soil Investigation work for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor

Borehole Location Plan

Borehole No.GT:107A



Borehole No.GT:108A

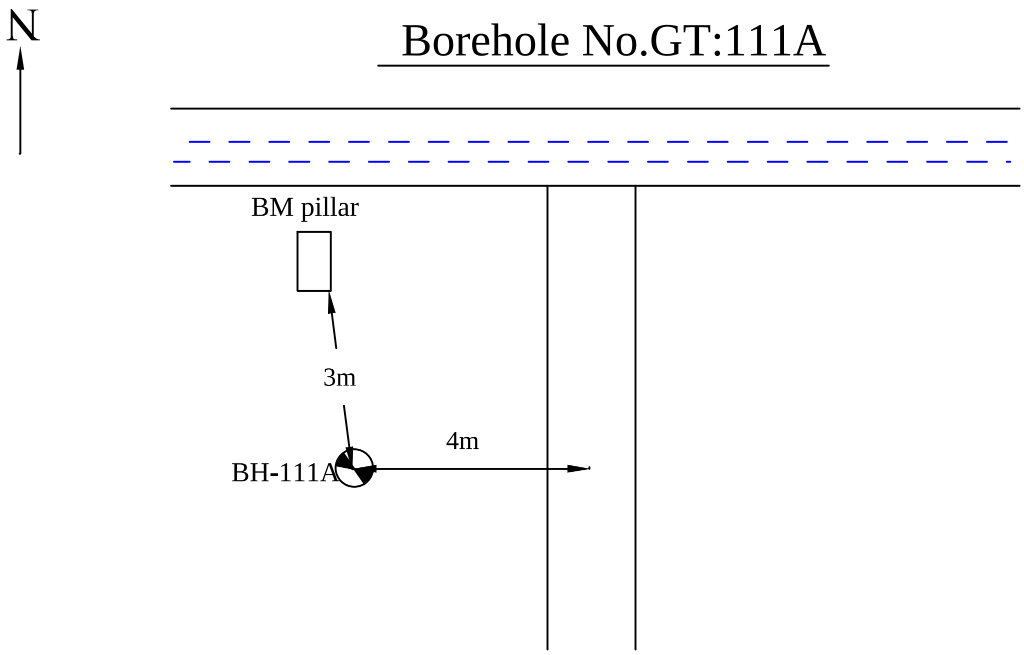


Not to scale	M/s ANAND RAJ INFRATECH PVT. LTD.	Page -

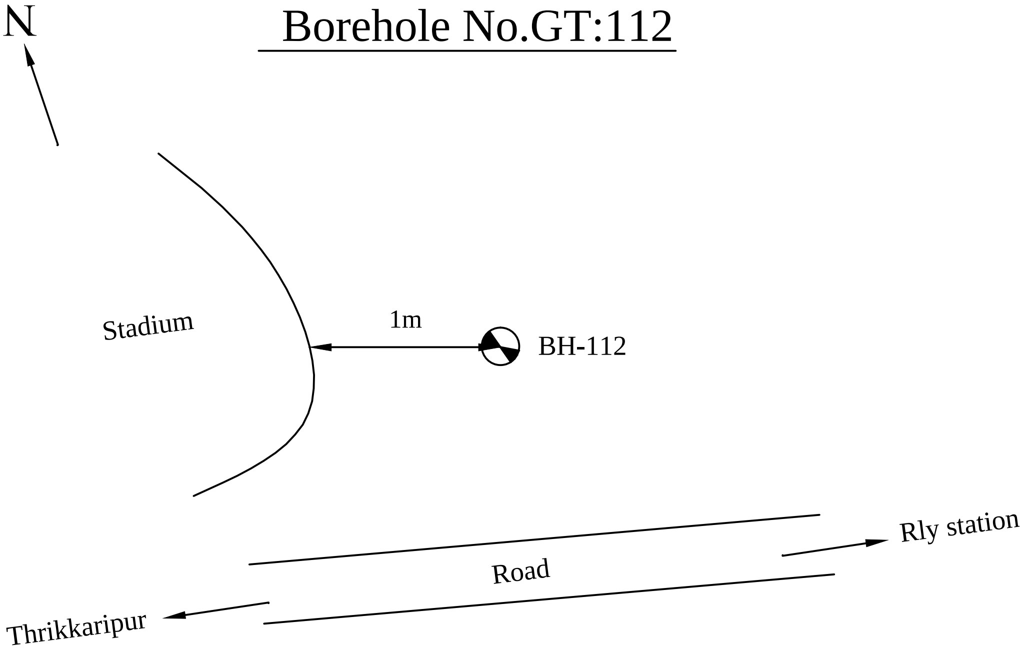
Project: Sub-soil Investigation work for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor

Borehole Location Plan

Borehole No.GT:111A



Borehole No.GT:112



Not to scale

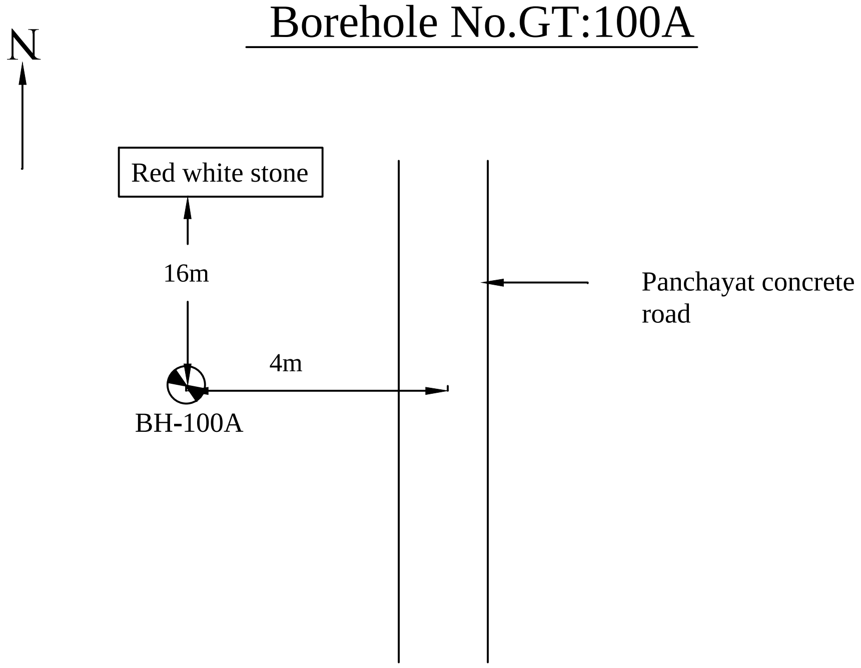
M/s ANAND RAJ INFRATECH PVT. LTD.

Page -

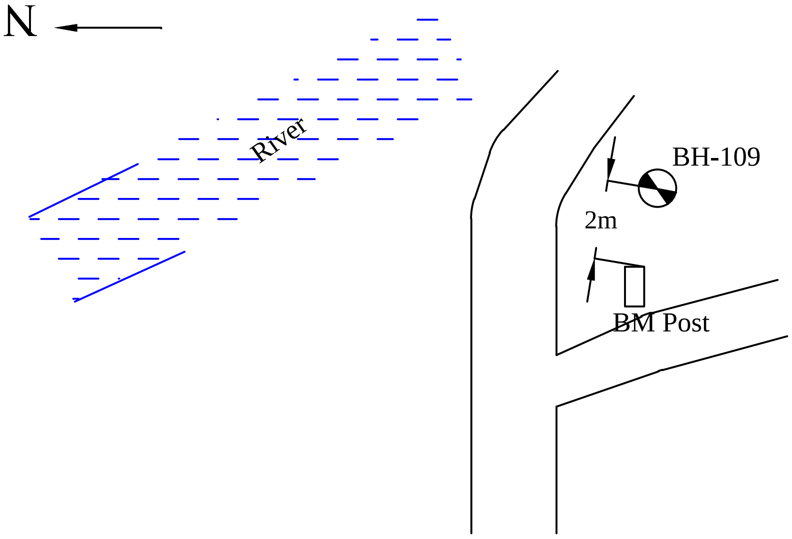
Project: Sub-soil Investigation work for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor

Borehole Location Plan

Borehole No.GT:100A



Borehole No.GT:109



Not to scale

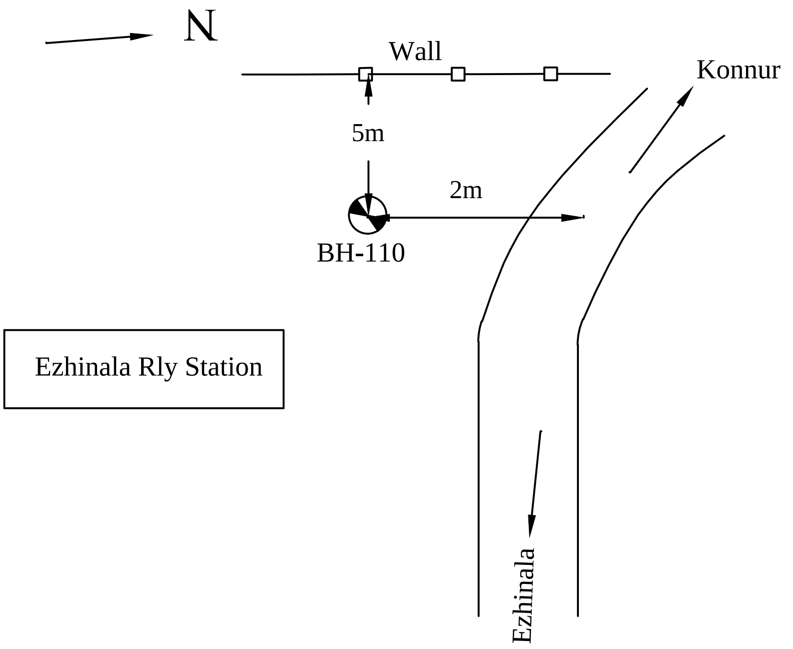
M/s ANAND RAJ INFRATECH PVT. LTD.

Page -

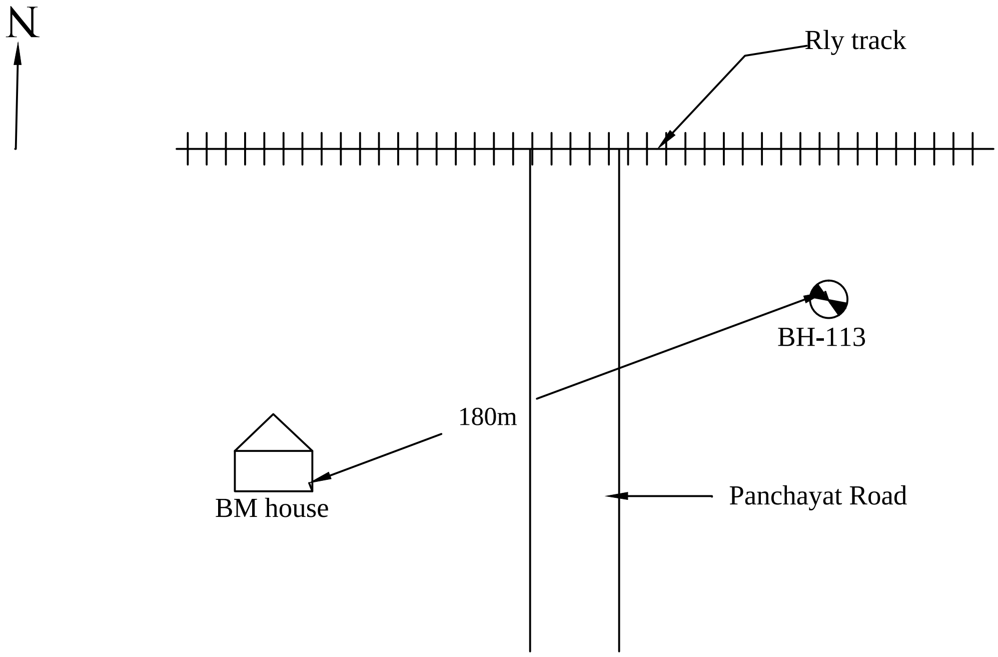
Project: Sub-soil Investigation work for Thiruvananthapuram-
Kasaragod Semi-High-Speed Rail Corridor

Borehole Location Plan

Borehole No.GT:110



Borehole No.GT:113

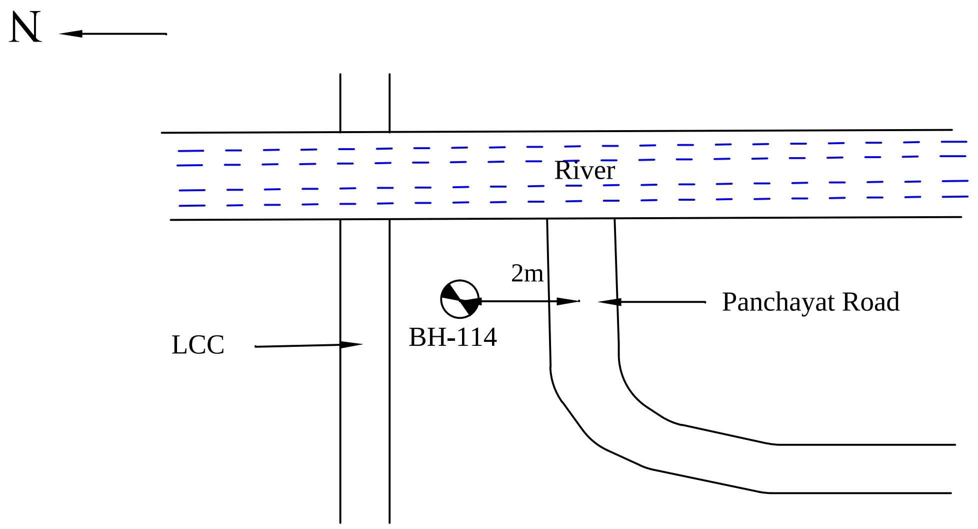


Not to scale	M/s ANAND RAJ INFRATECH PVT. LTD.	Page -

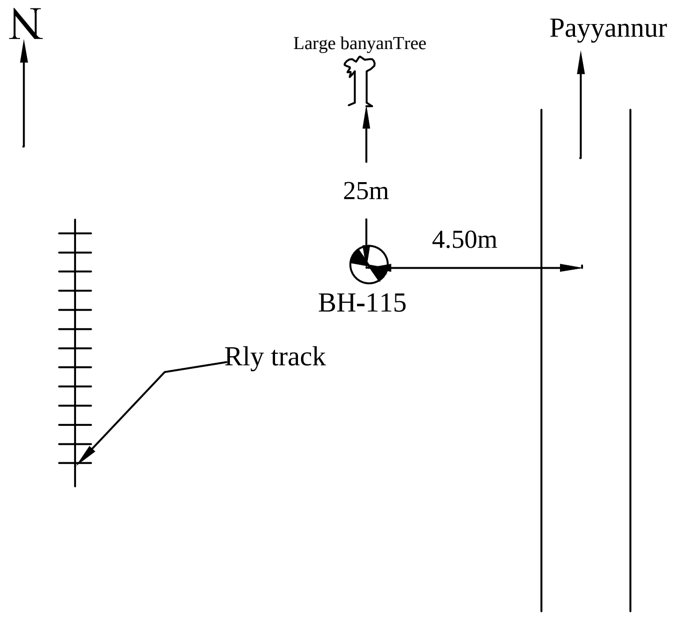
Project: Sub-soil Investigation work for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor

Borehole Location Plan

Borehole No.GT:114



Borehole No.GT:115

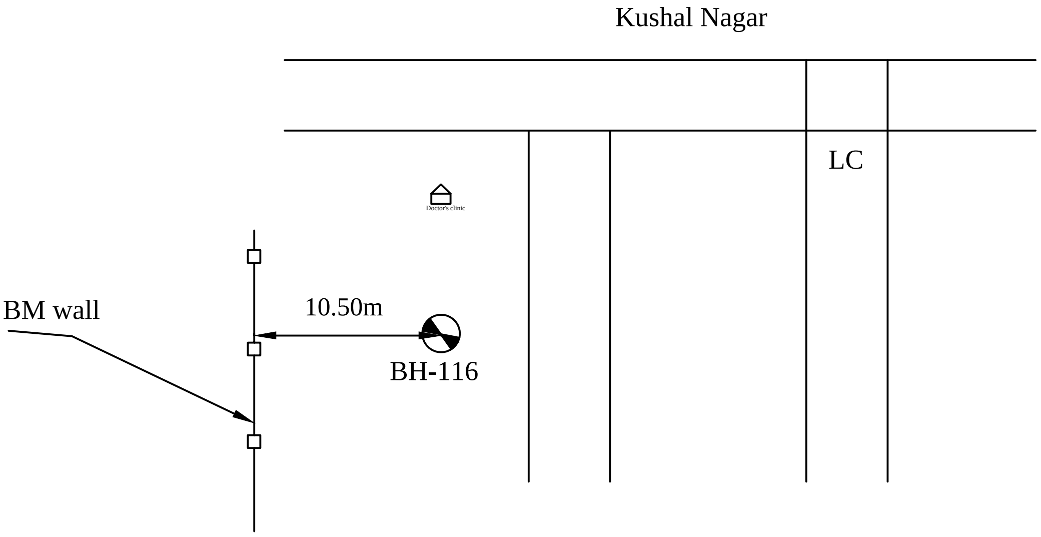


Not to scale	M/s ANAND RAJ INFRATECH PVT. LTD.	Page -

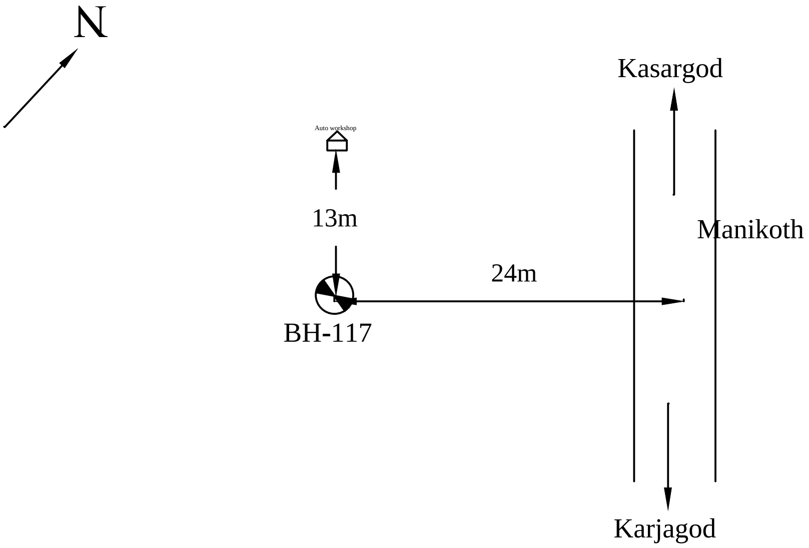
Project: Sub-soil Investigation work for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor

Borehole Location Plan

Borehole No.GT:116



Borehole No.GT:117

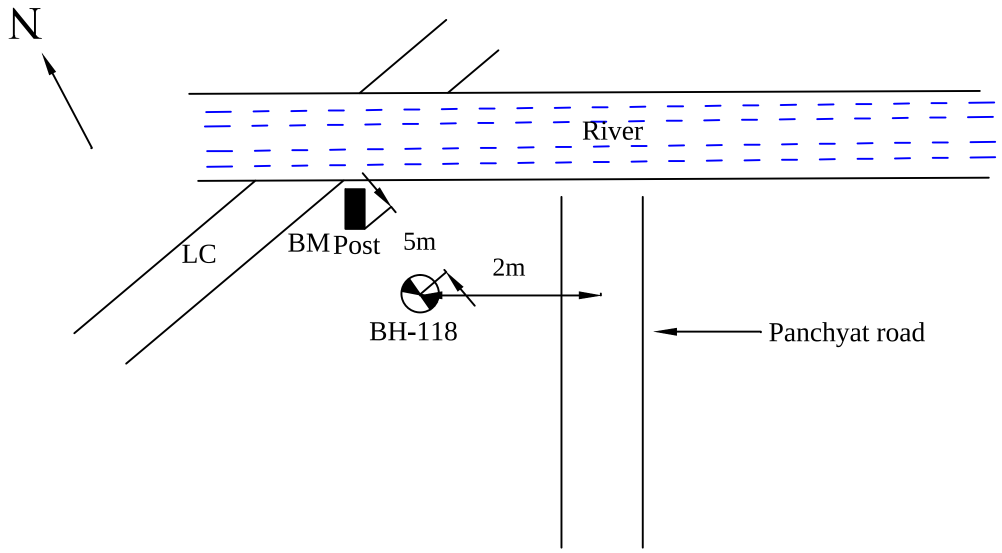


Not to scale	M/s ANAND RAJ INFRATECH PVT. LTD.	Page -

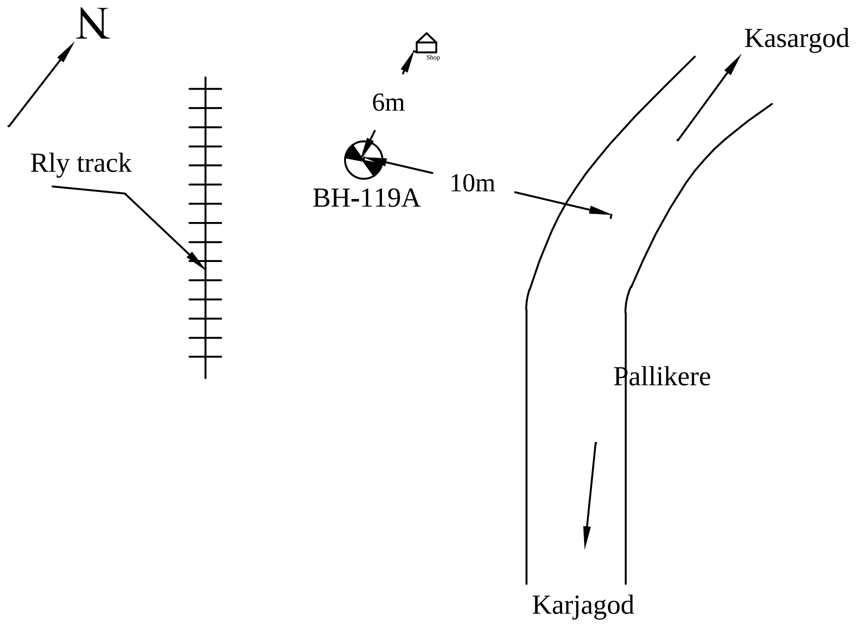
Project: Sub-soil Investigation work for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor

Borehole Location Plan

Borehole No.GT:118



Borehole No.GT:119A



Not to scale

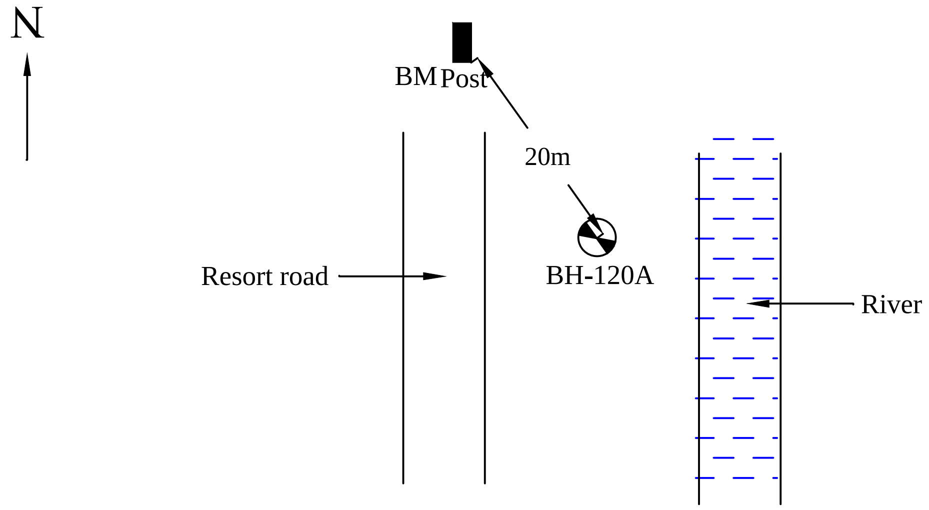
M/s ANAND RAJ INFRATECH PVT. LTD.

Page -

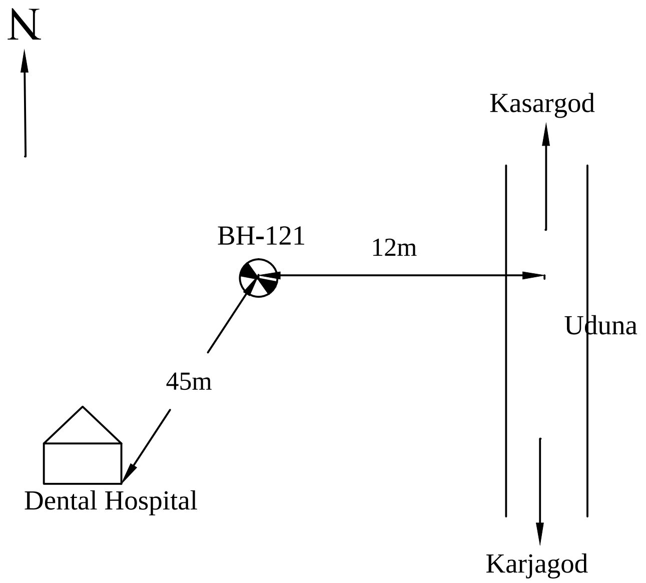
Project: Sub-soil Investigation work for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor

Borehole Location Plan

Borehole No.GT:120A



Borehole No.GT:121

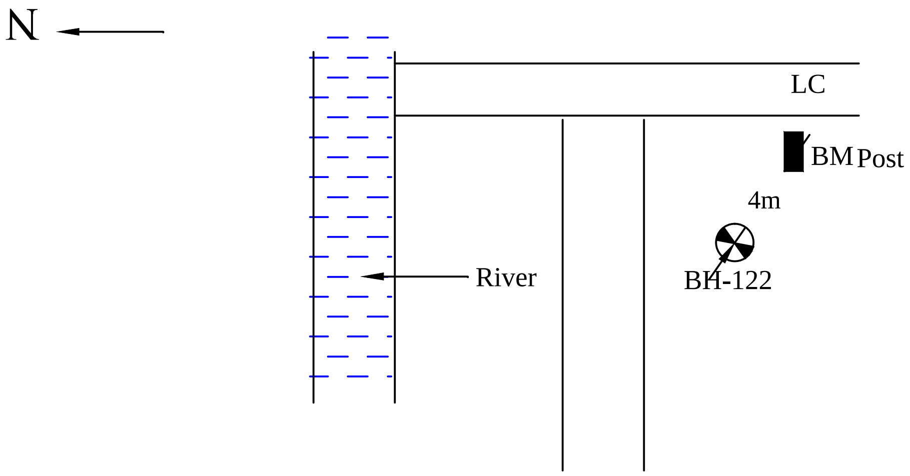


Not to scale	M/s ANAND RAJ INFRATECH PVT. LTD.	Page -

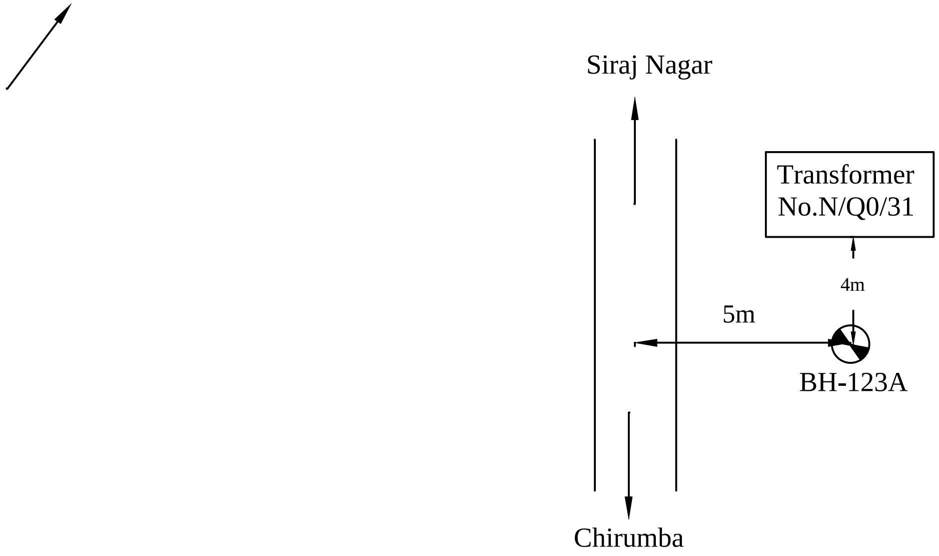
Project: Sub-soil Investigation work for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor

Borehole Location Plan

Borehole No.GT:122



Borehole No.GT:123A



Not to scale	M/s ANAND RAJ INFRATECH PVT. LTD.	Page -

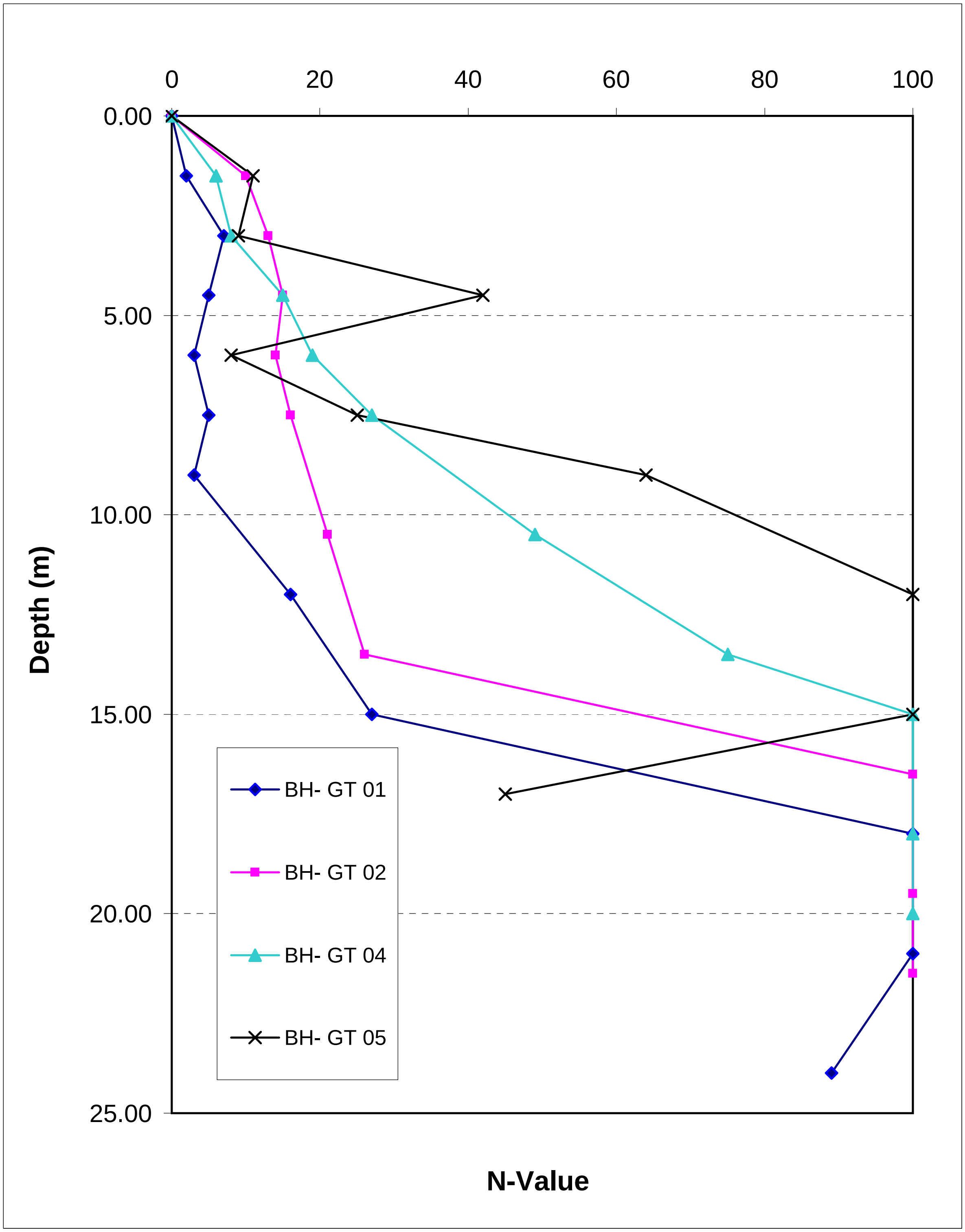


Figure 2: Distribution of Field N-Value with Depth

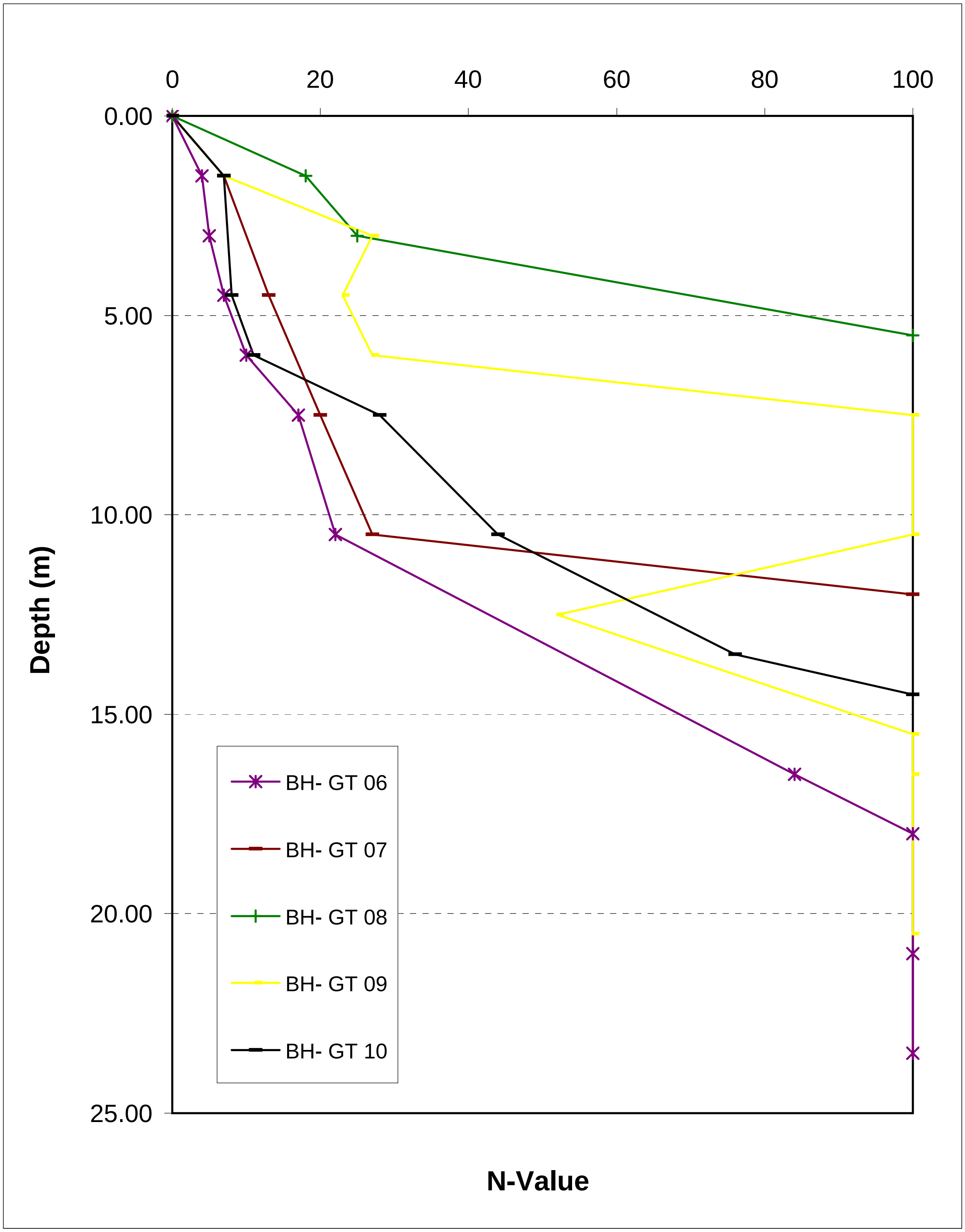


Figure 2: Distribution of Field N-Value with Depth

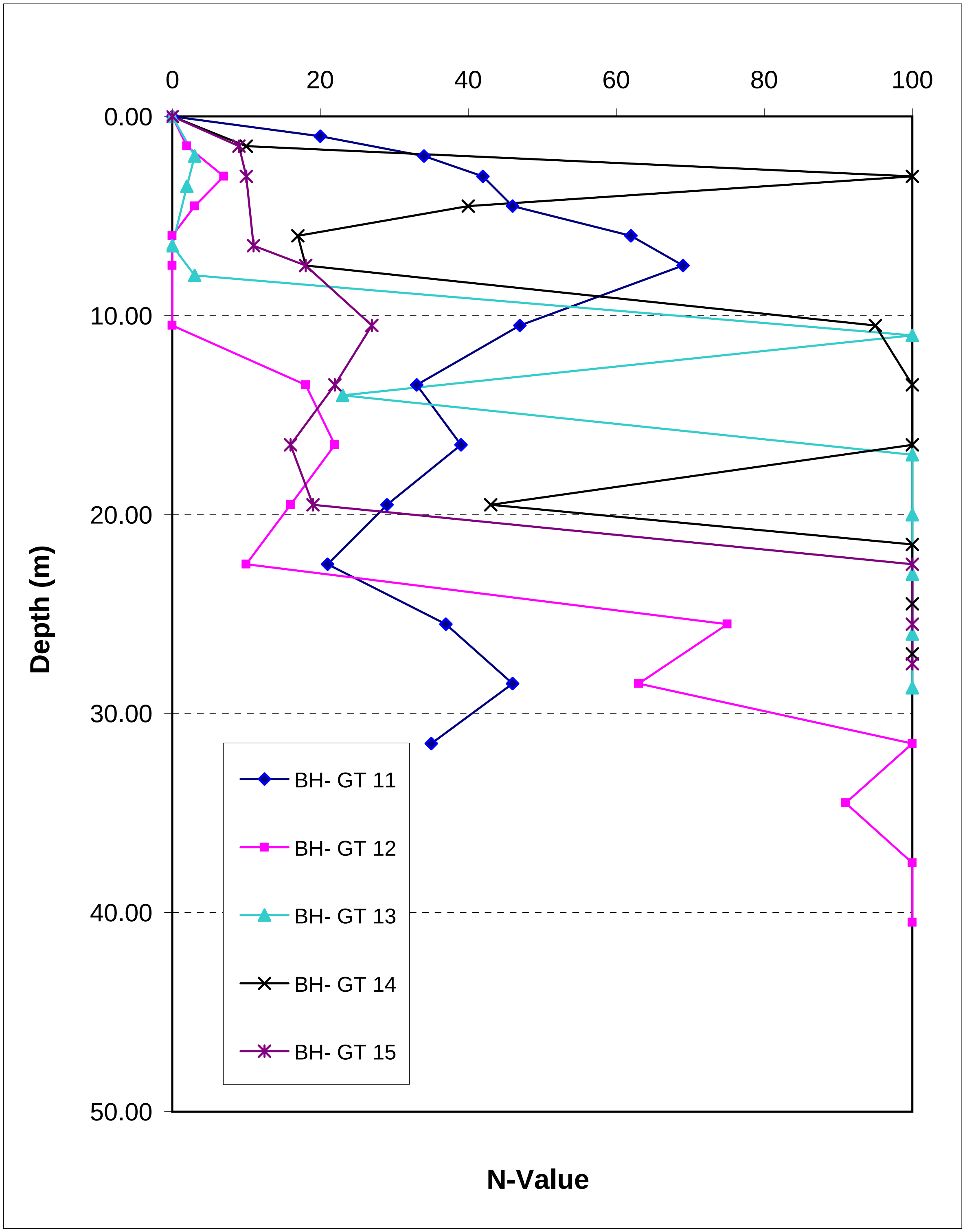


Figure 2: Distribution of Field N-Value with Depth

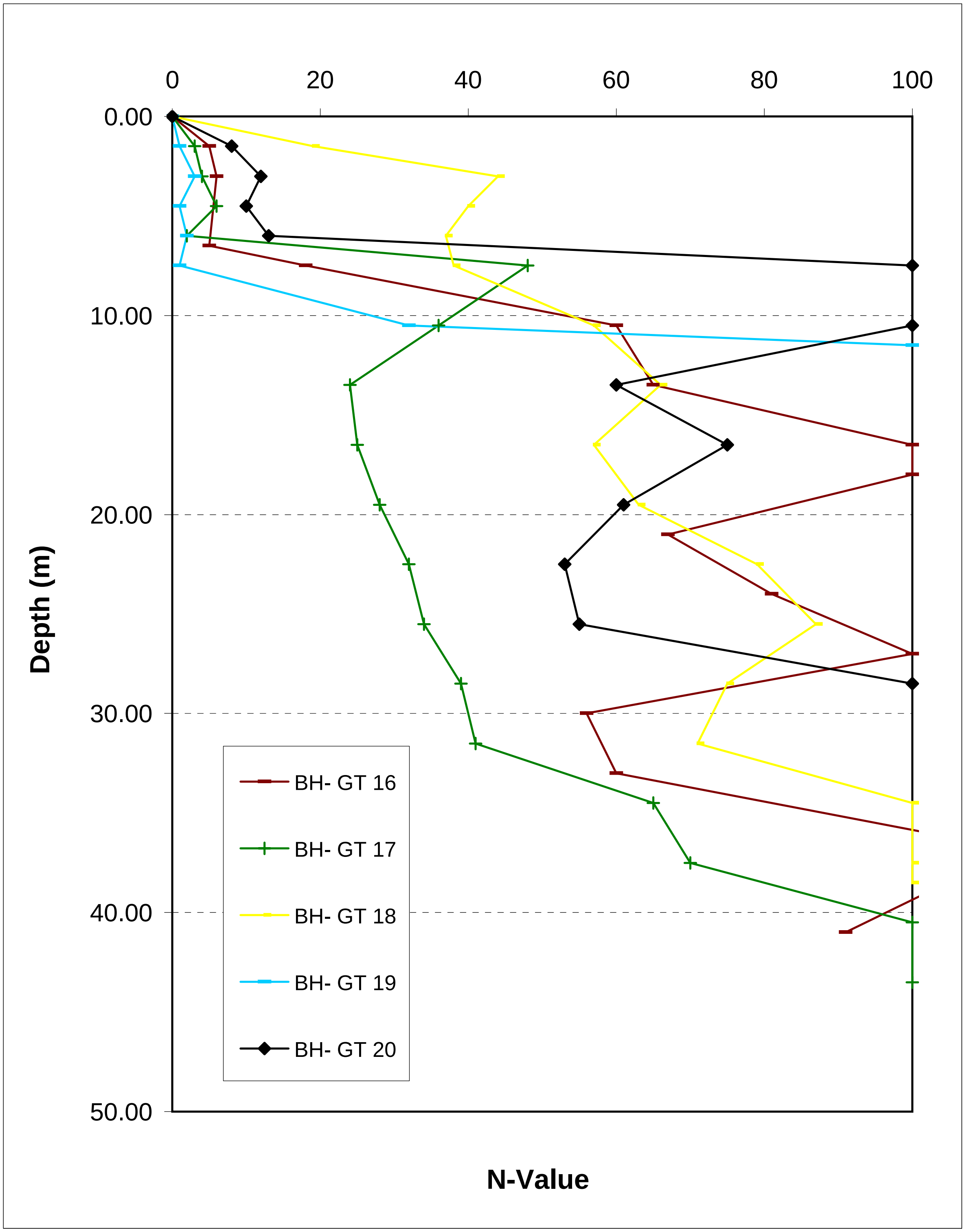


Figure 2: Distribution of Field N-Value with Depth

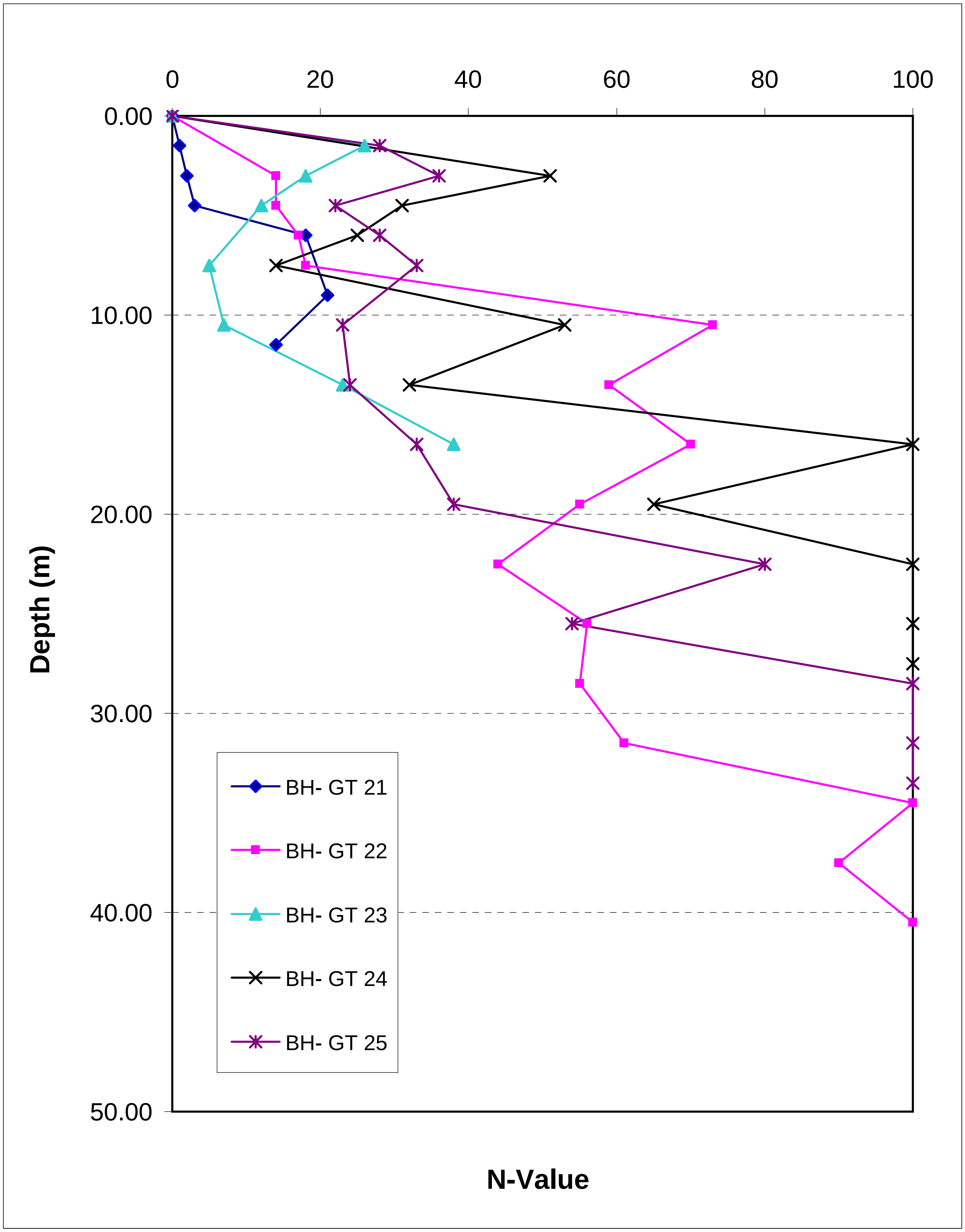


Figure 2: Distribution of Field N-Value with Depth

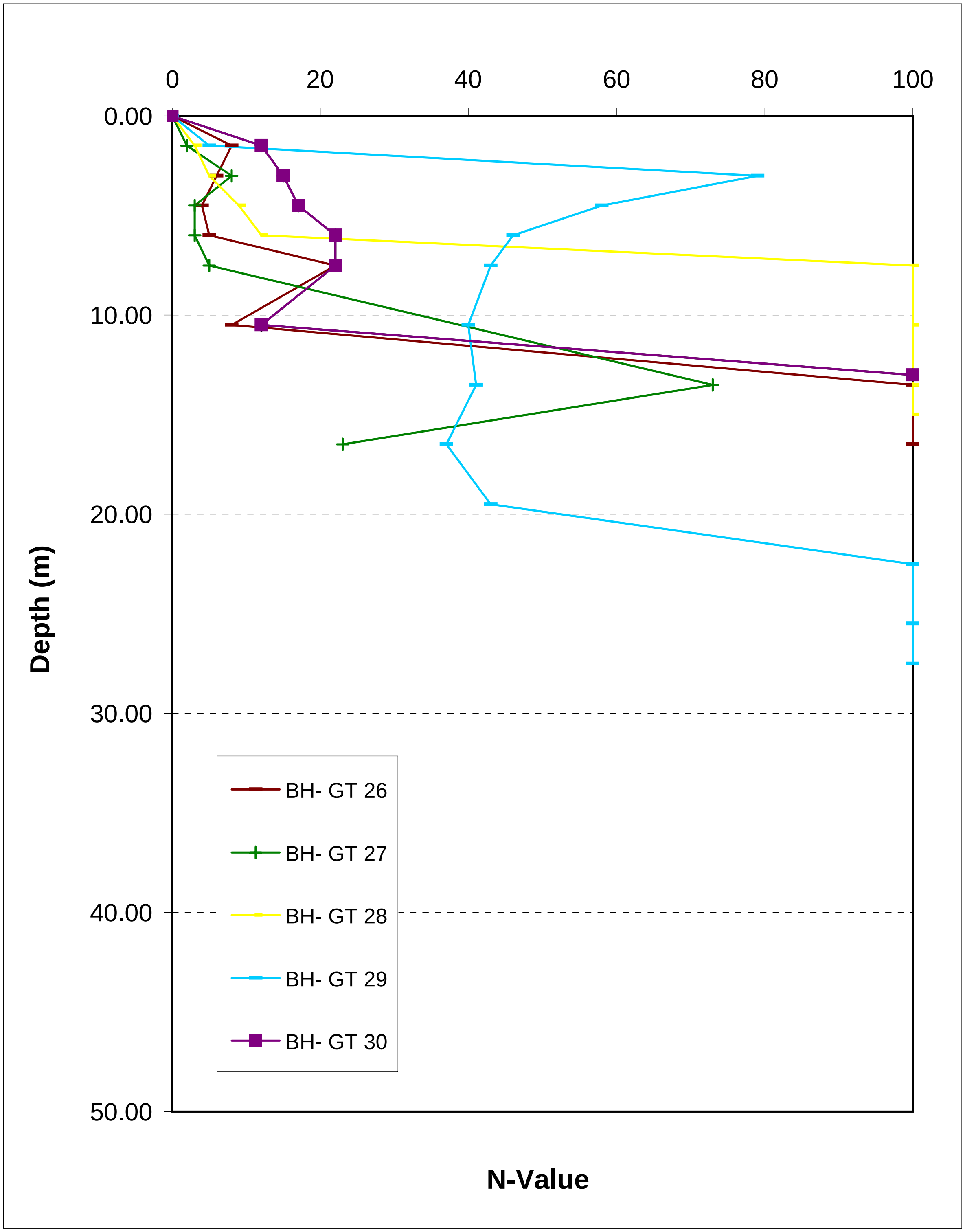


Figure 2: Distribution of Field N-Value with Depth

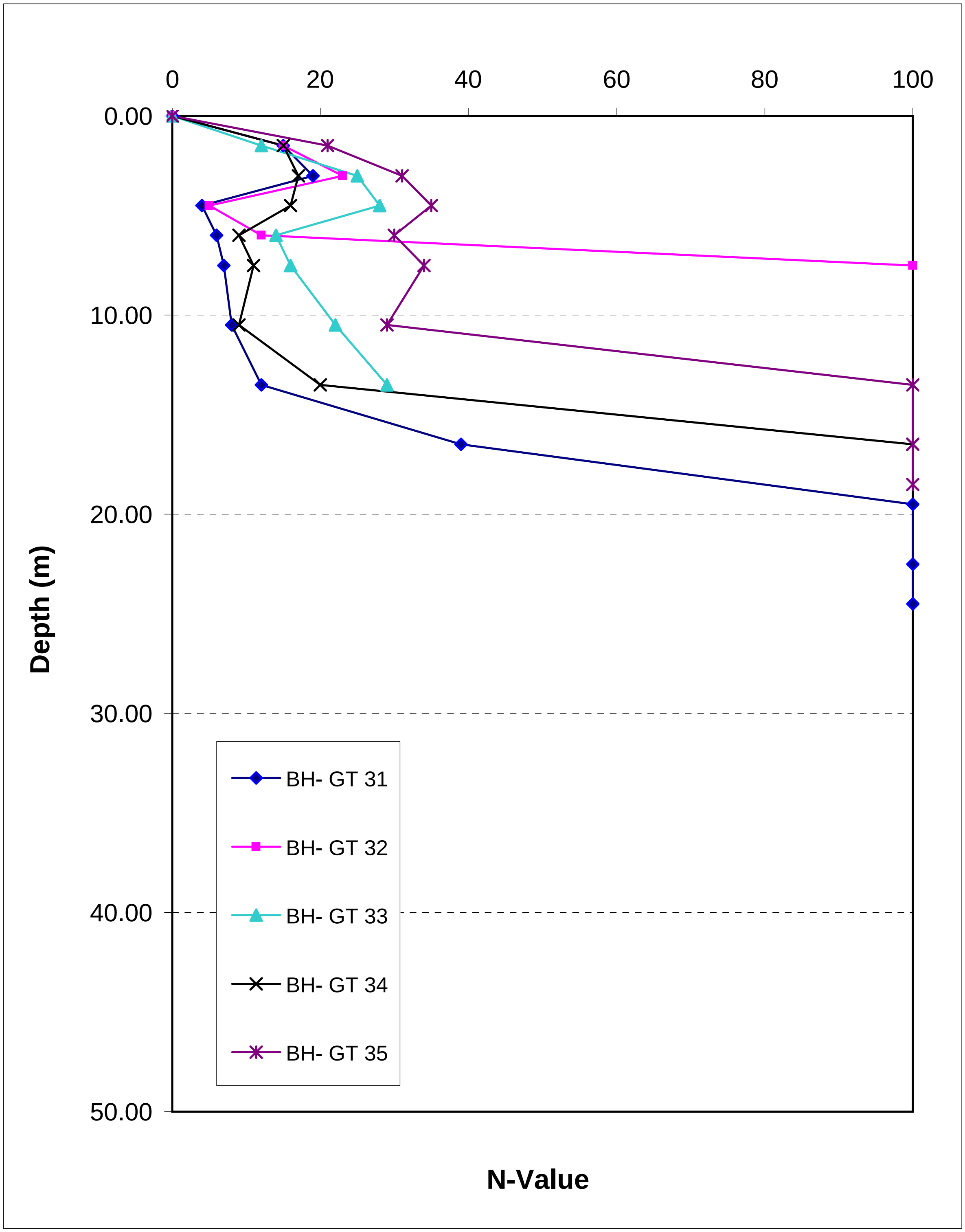


Figure 2: Distribution of Field N-Value with Depth

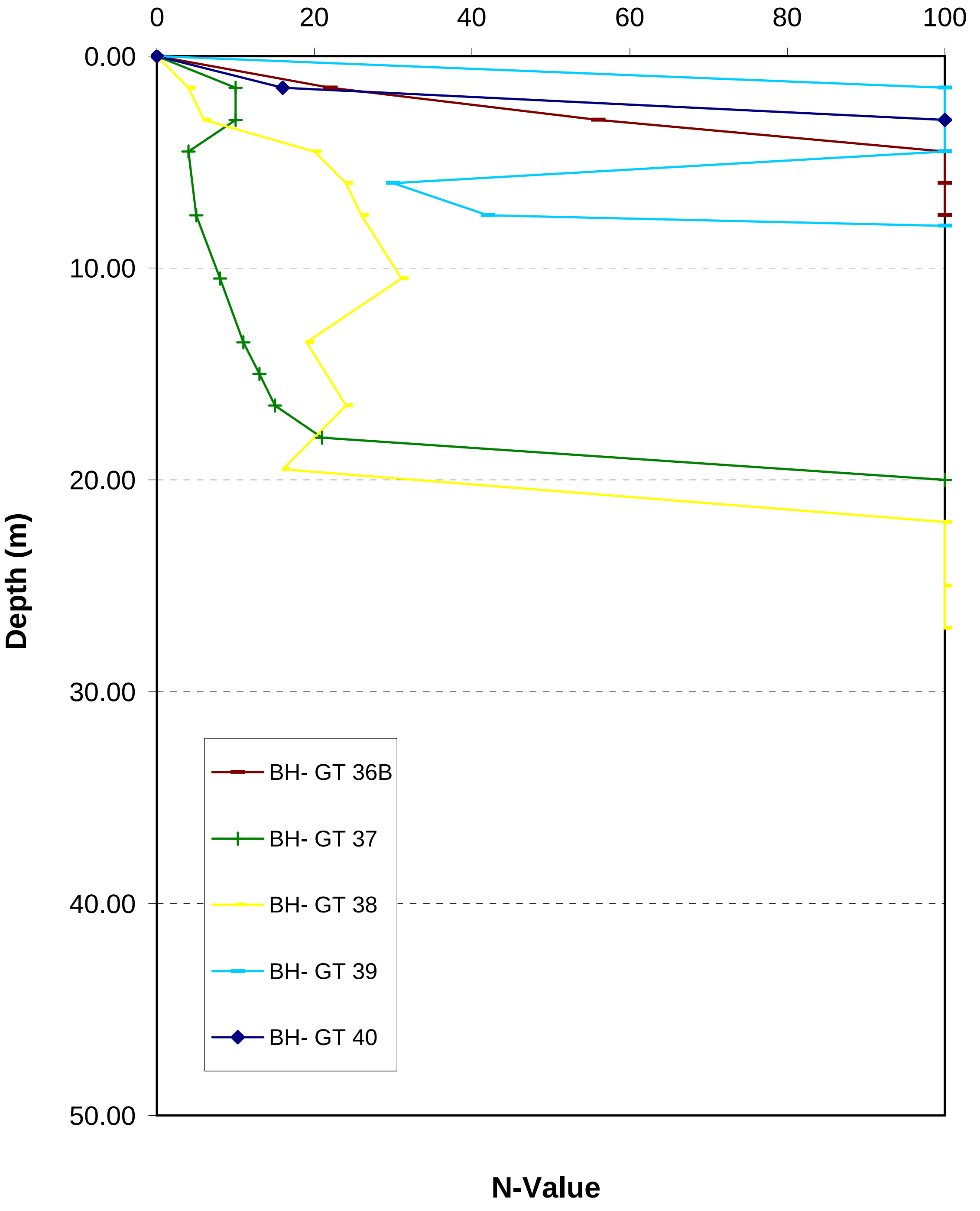


Figure 2: Distribution of Field N-Value with Depth

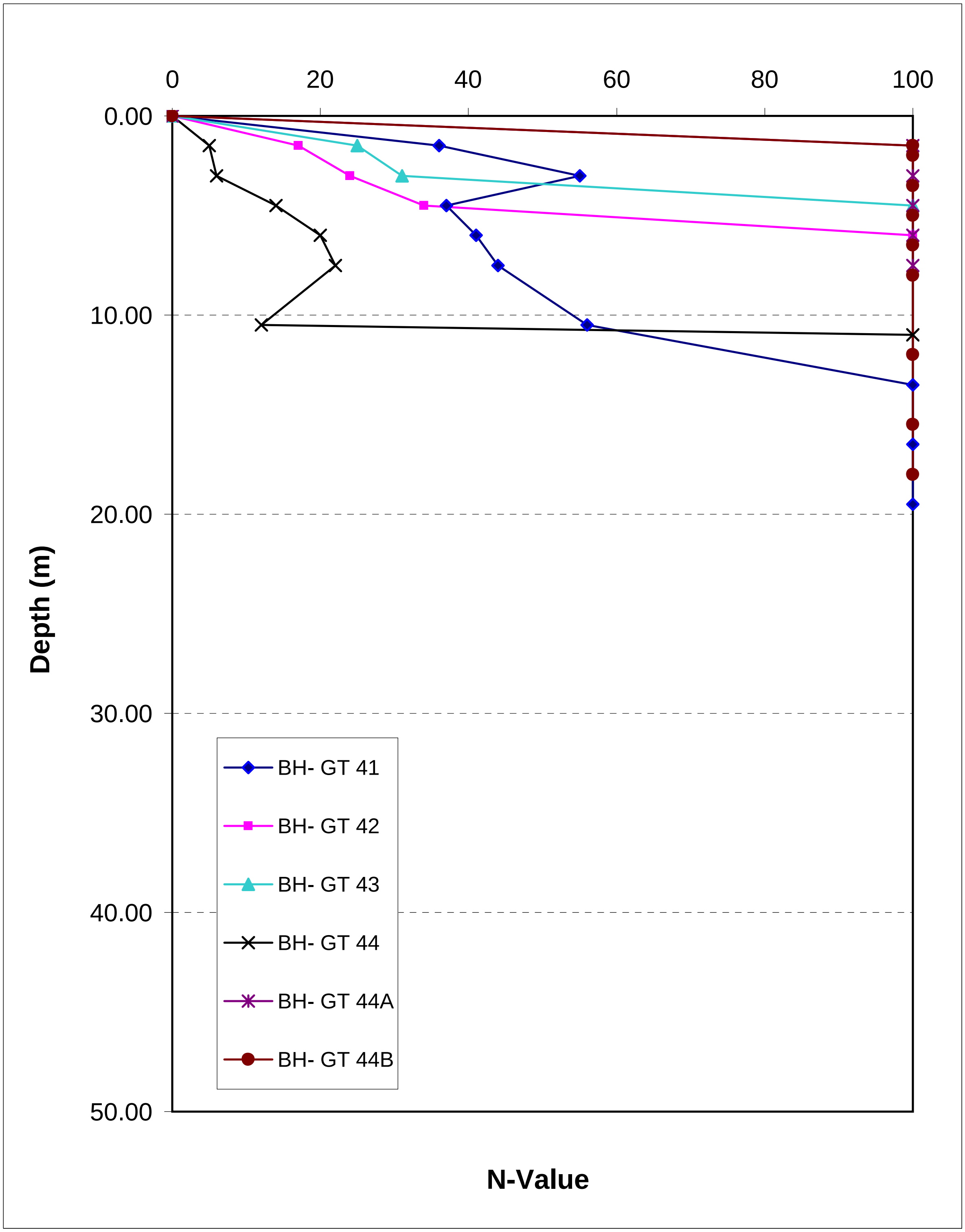


Figure 2: Distribution of Field N-Value with Depth

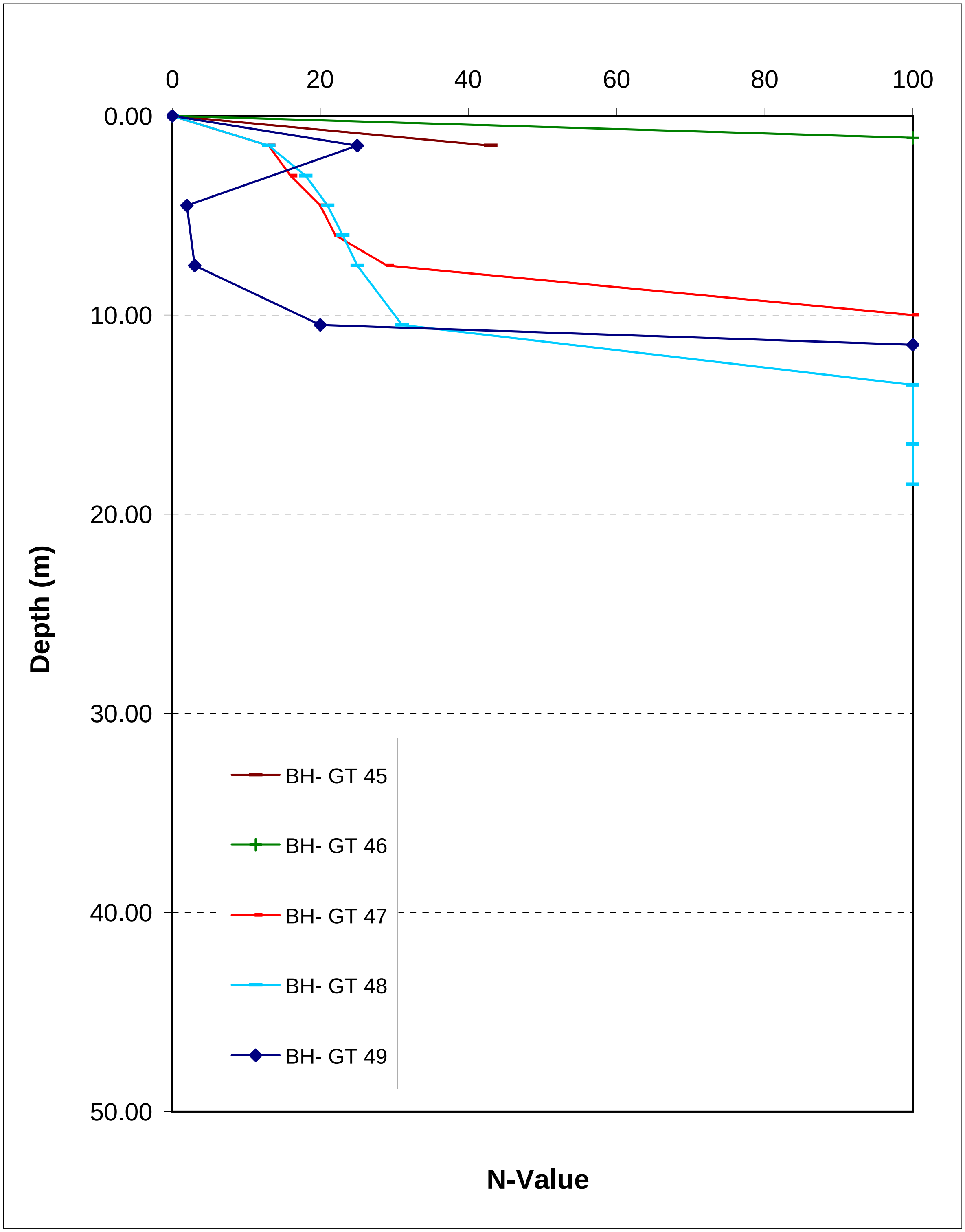
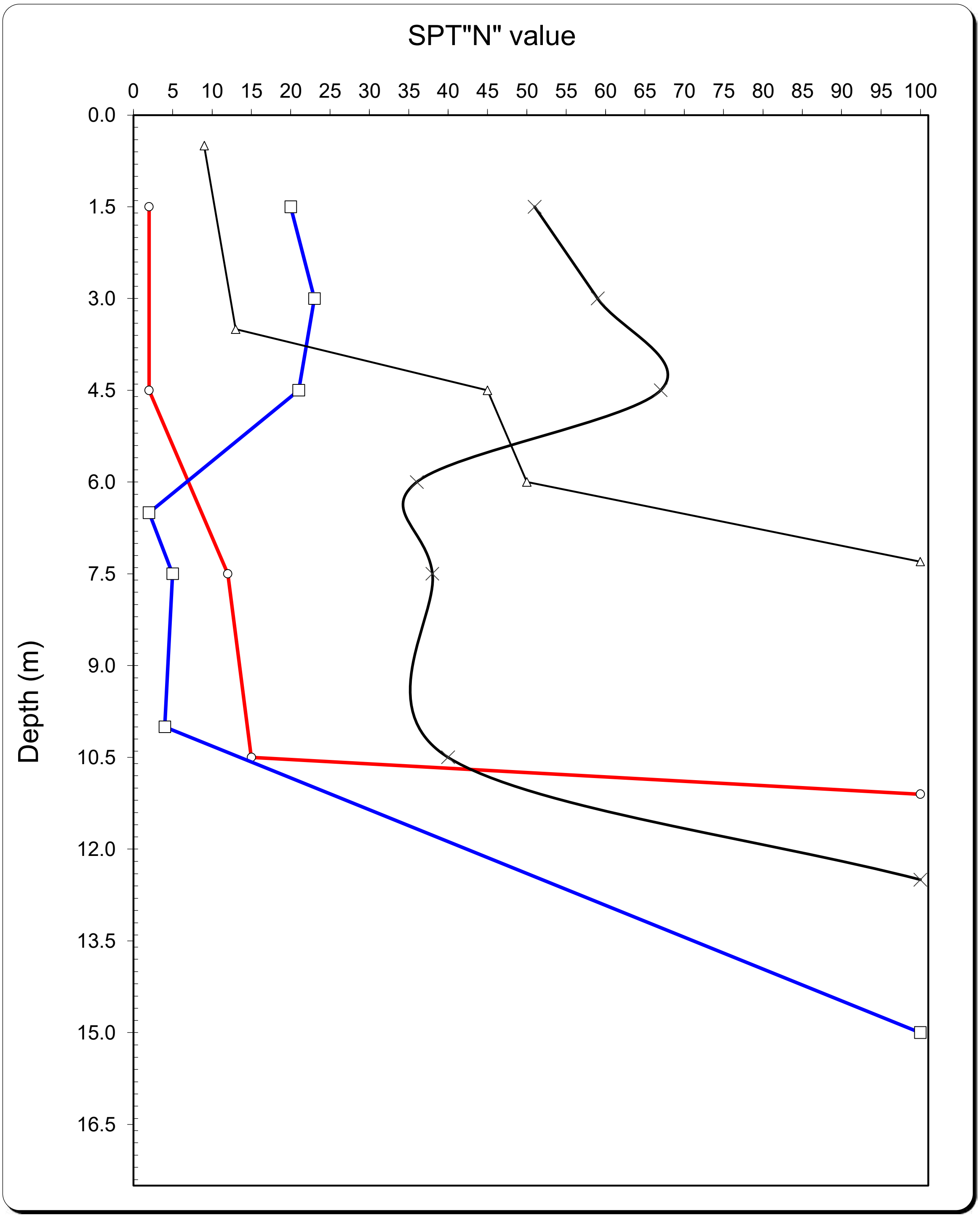


Figure 2: Distribution of Field N-Value with Depth

M/s ANAND RAJ INFRATECH PVT. LTD.

Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

Graphical Presentation "Depth" vs Observed SPT "N" value

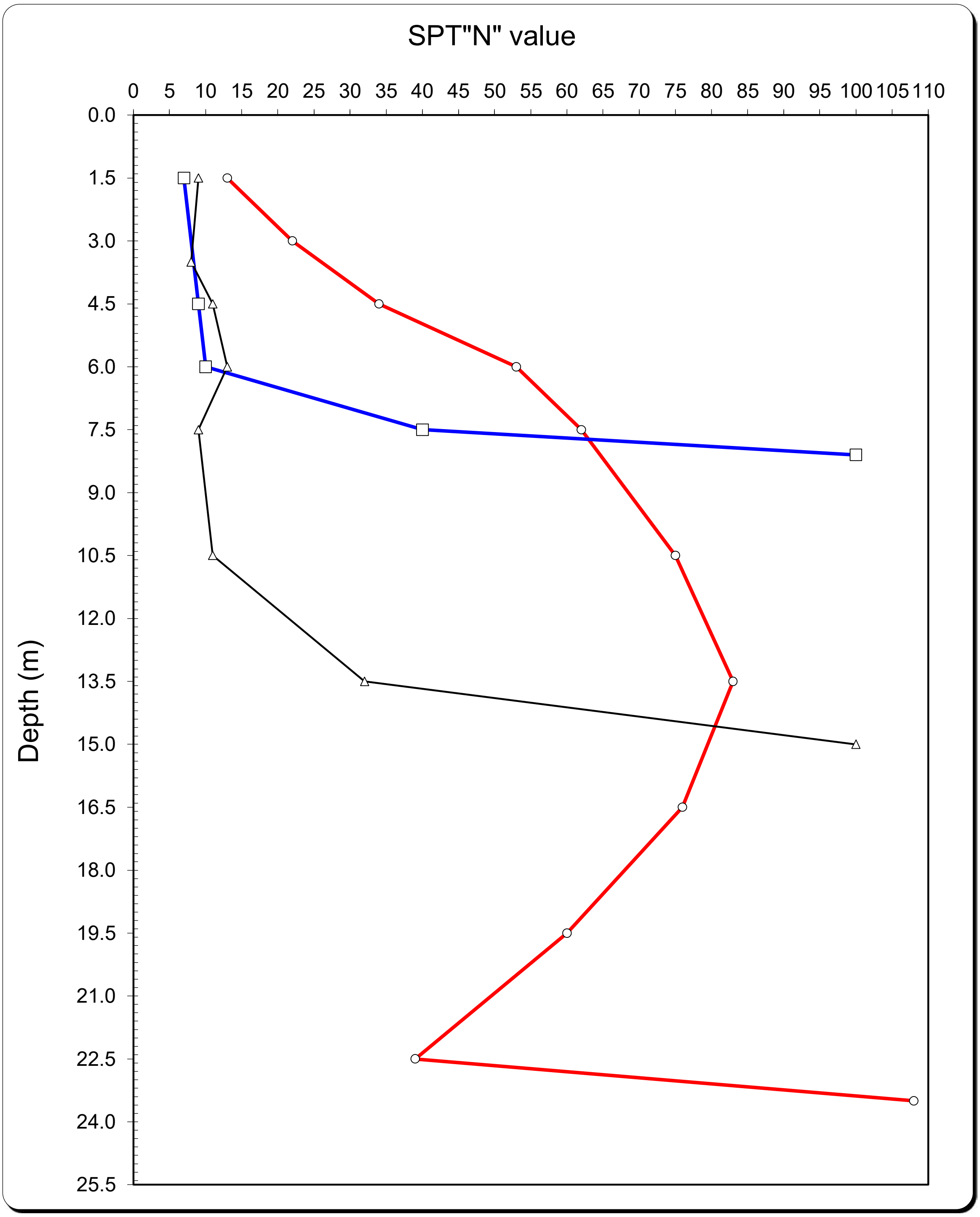


Symbol	BH No
○	50B
□	51A
△	52A
X	53A

M/s ANAND RAJ INFRATECH PVT. LTD.

Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

Graphical Presentation "Depth" vs Observed SPT "N" value

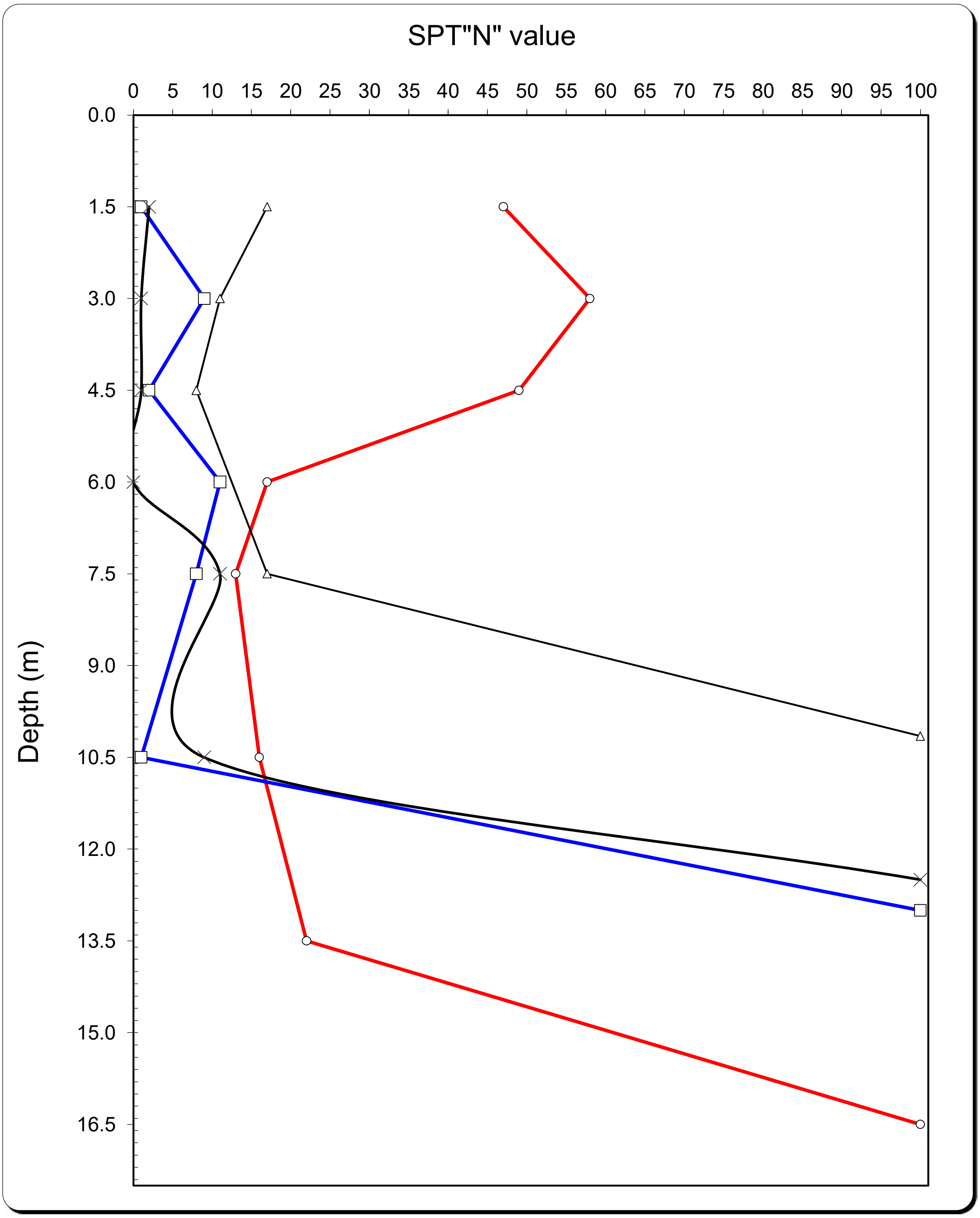


Symbol	BH No
—○—	54
—□—	57B
—△—	58A

M/s ANAND RAJ INFRATECH PVT. LTD.

Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

Graphical Presentation "Depth" vs Observed SPT "N" value

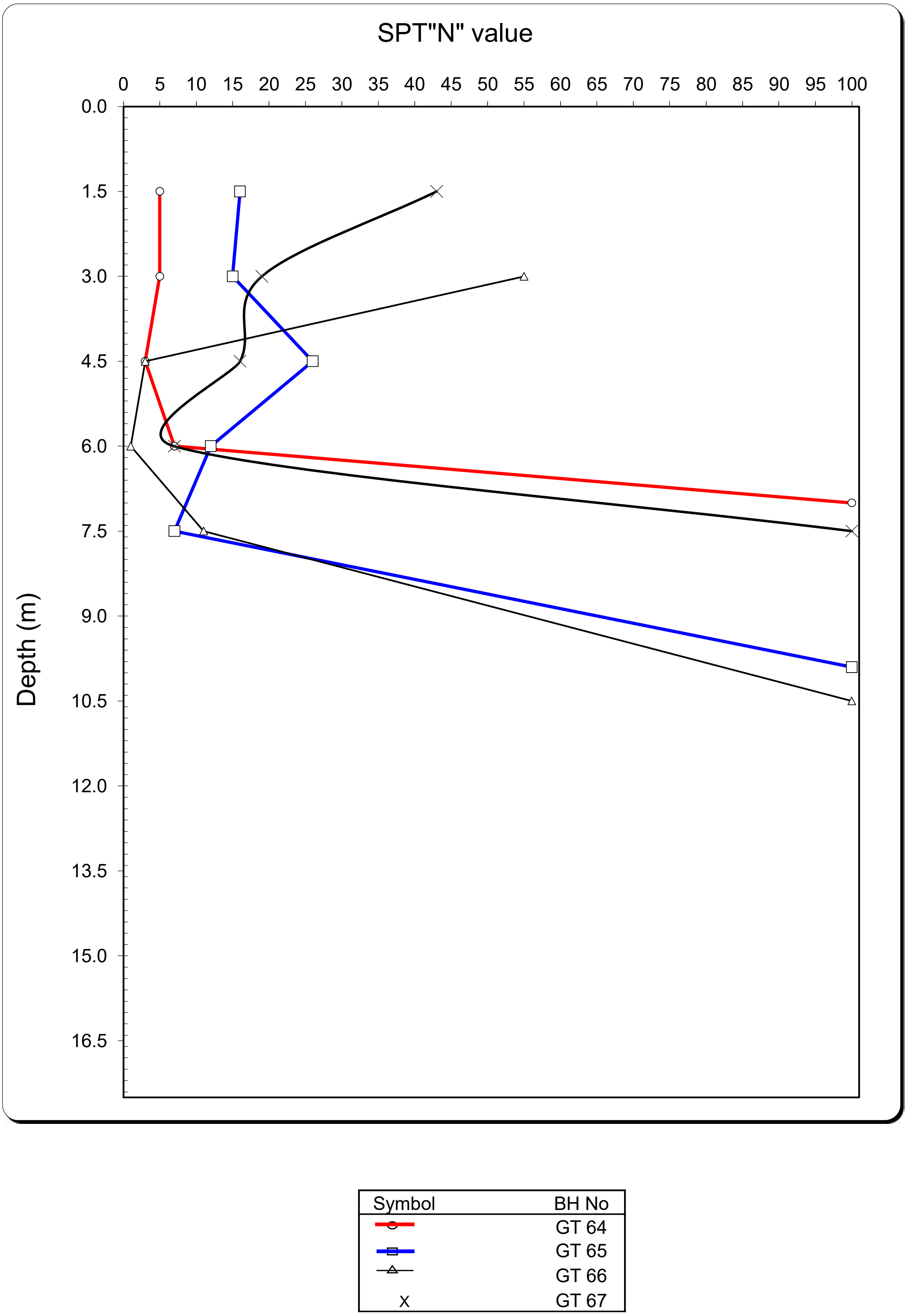


Symbol	BH No
○	GT 60
□	GT 61
△	GT 62
X	GT 63

M/s ANAND RAJ INFRATECH PVT. LTD.

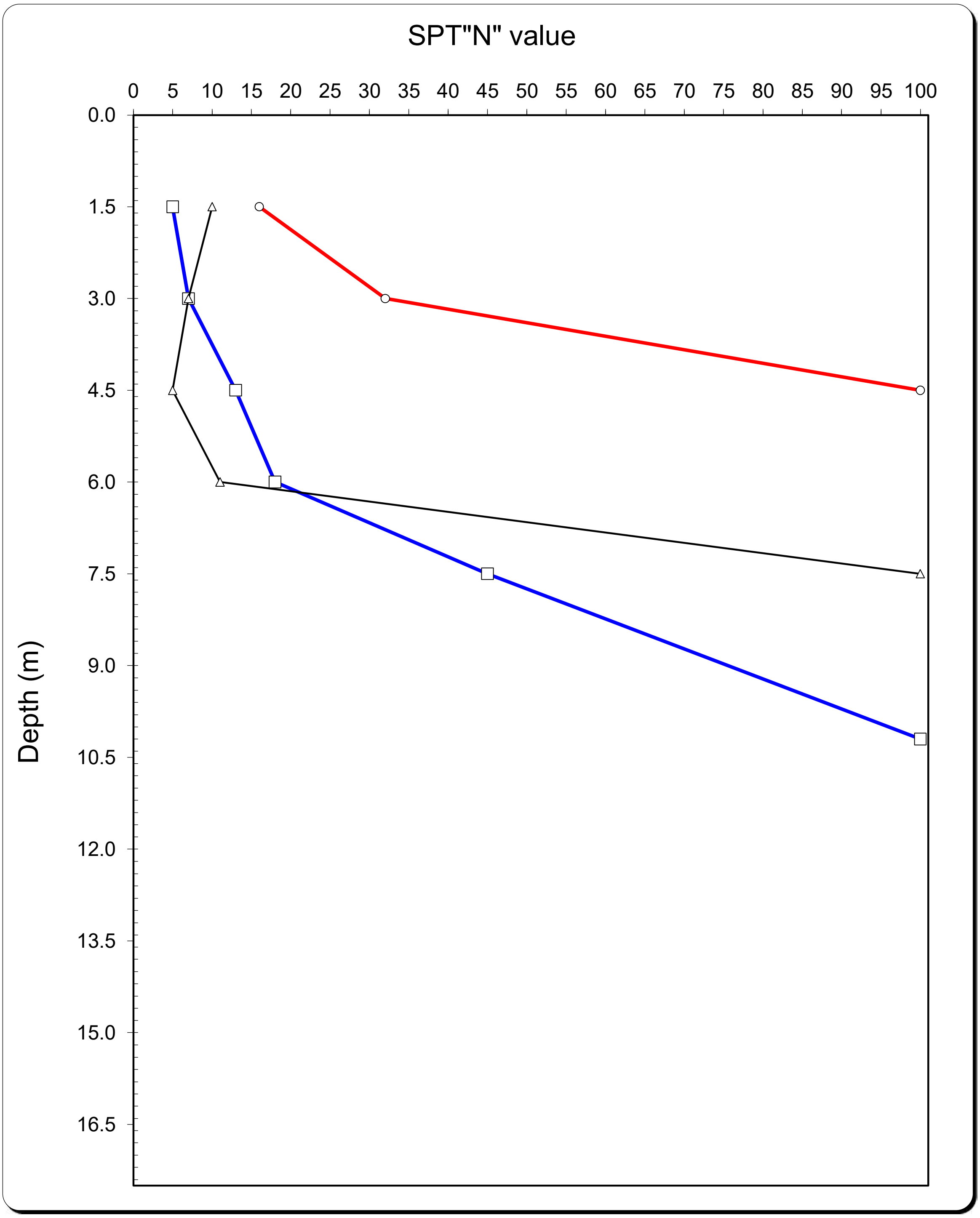
Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

Graphical Presentation "Depth" vs Observed SPT "N" value



Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

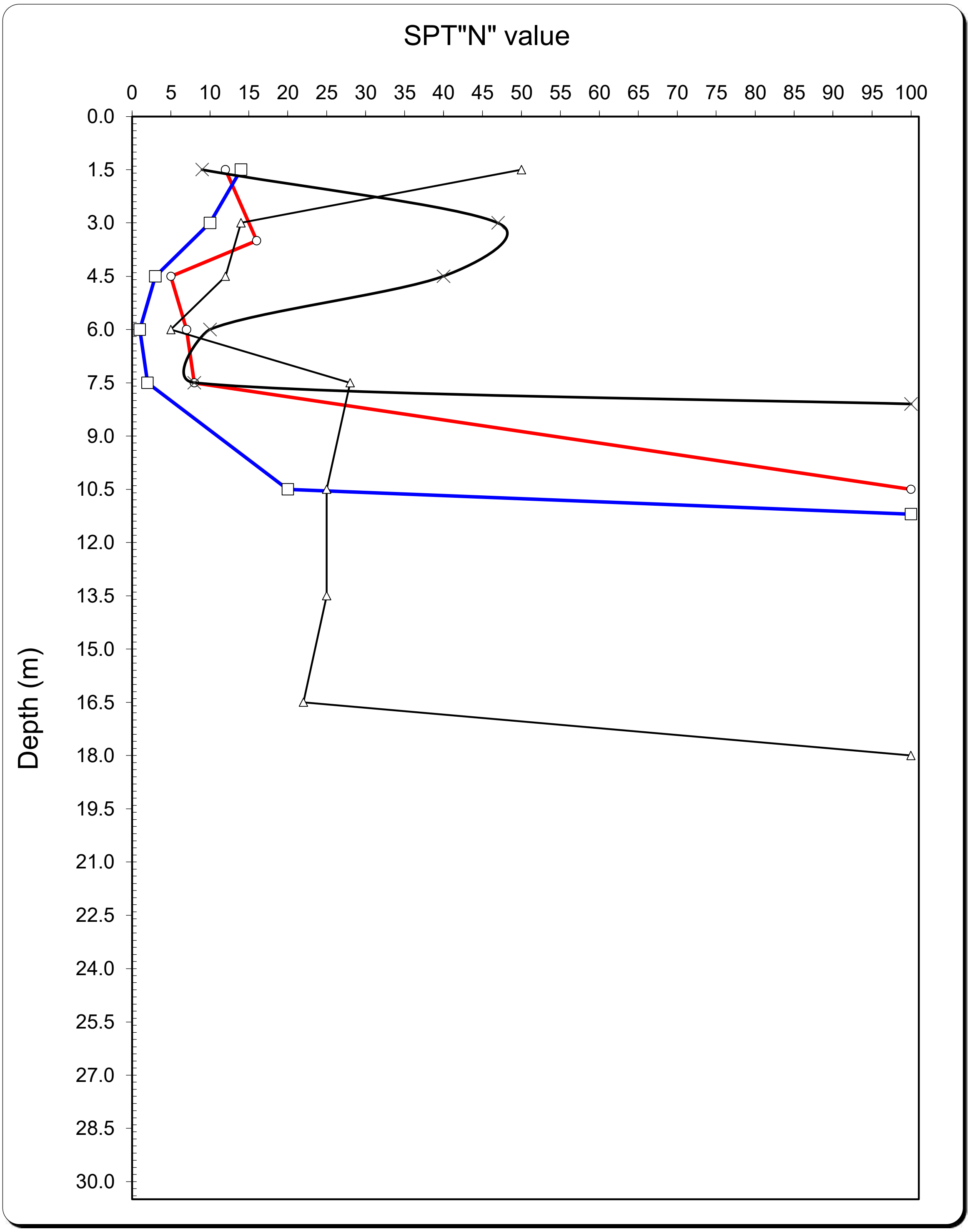
Graphical Presentation "Depth" vs Observed SPT "N" value



Symbol	BH No
○	GT 68
□	GT 69A
△	GT 70

Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

Graphical Presentation "Depth" vs Observed SPT "N" value

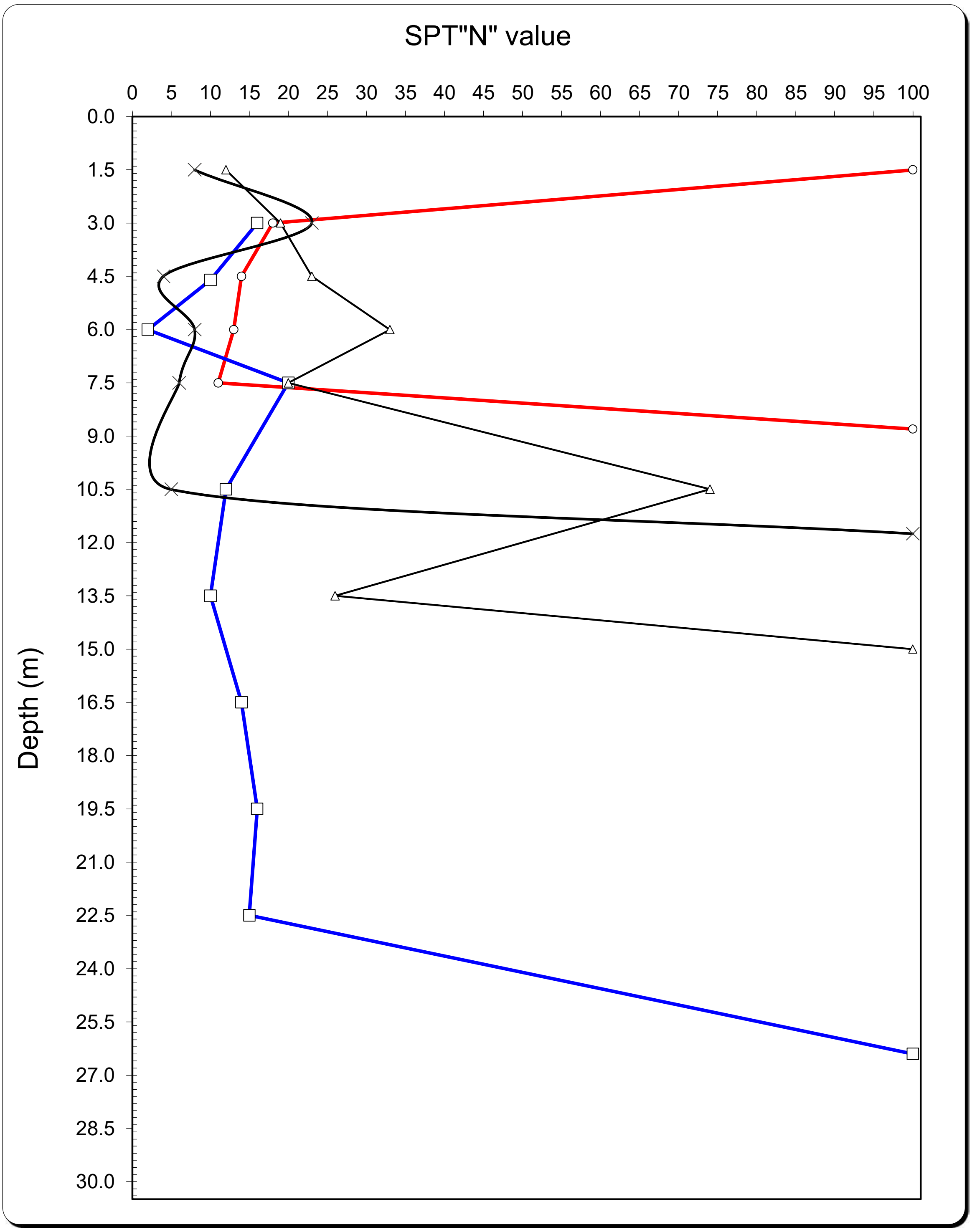


Symbol	BH No
—○—	GT 55A
—□—	GT 71
—△—	GT 72
X	GT 73

M/s ANAND RAJ INFRATECH PVT. LTD.

Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

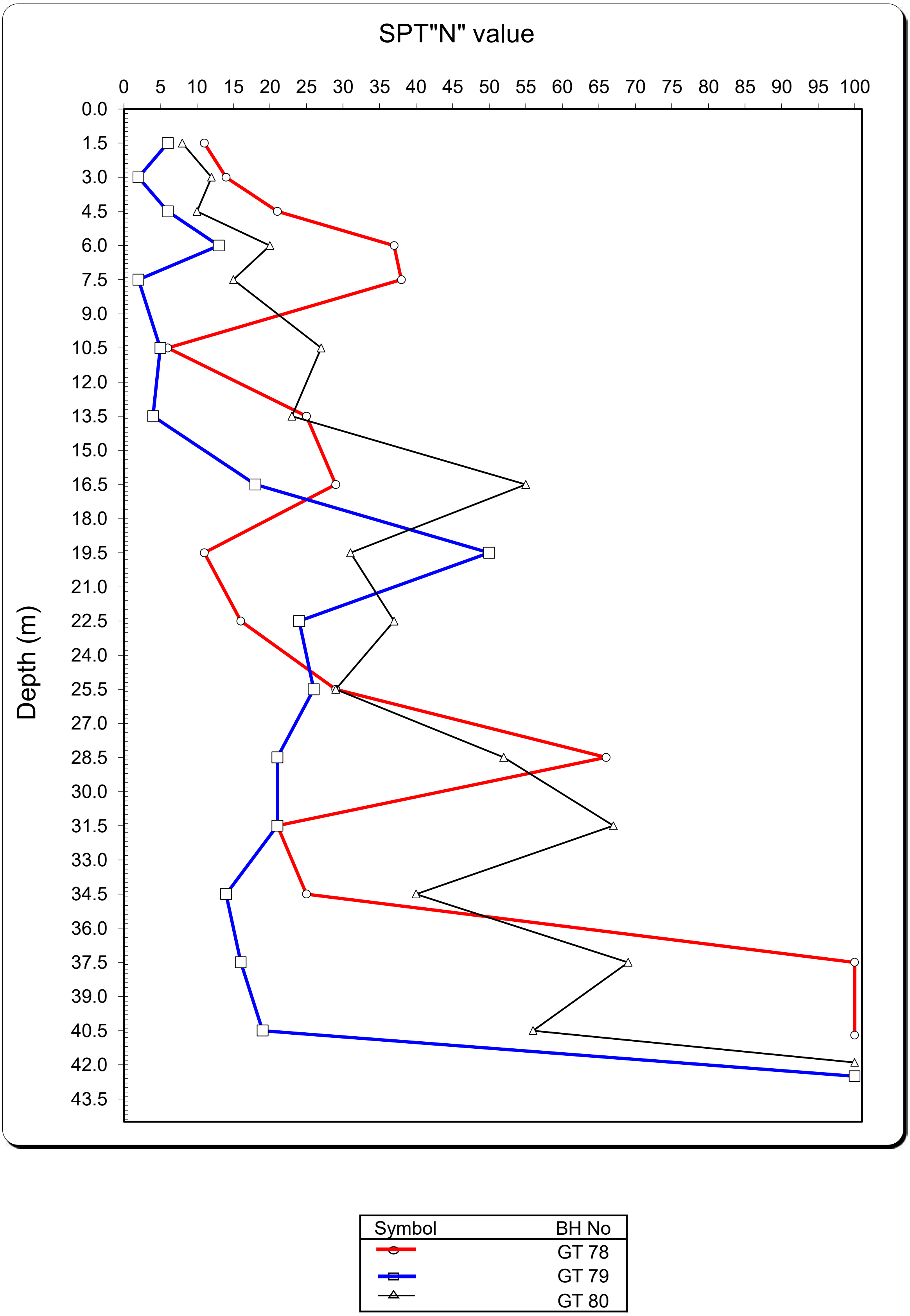
Graphical Presentation "Depth" vs Observed SPT "N" value



Symbol	BH No
—○—	GT 74
—□—	GT 75A
—△—	GT 76
X	GT 77

Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

Graphical Presentation "Depth" vs Observed SPT "N" value



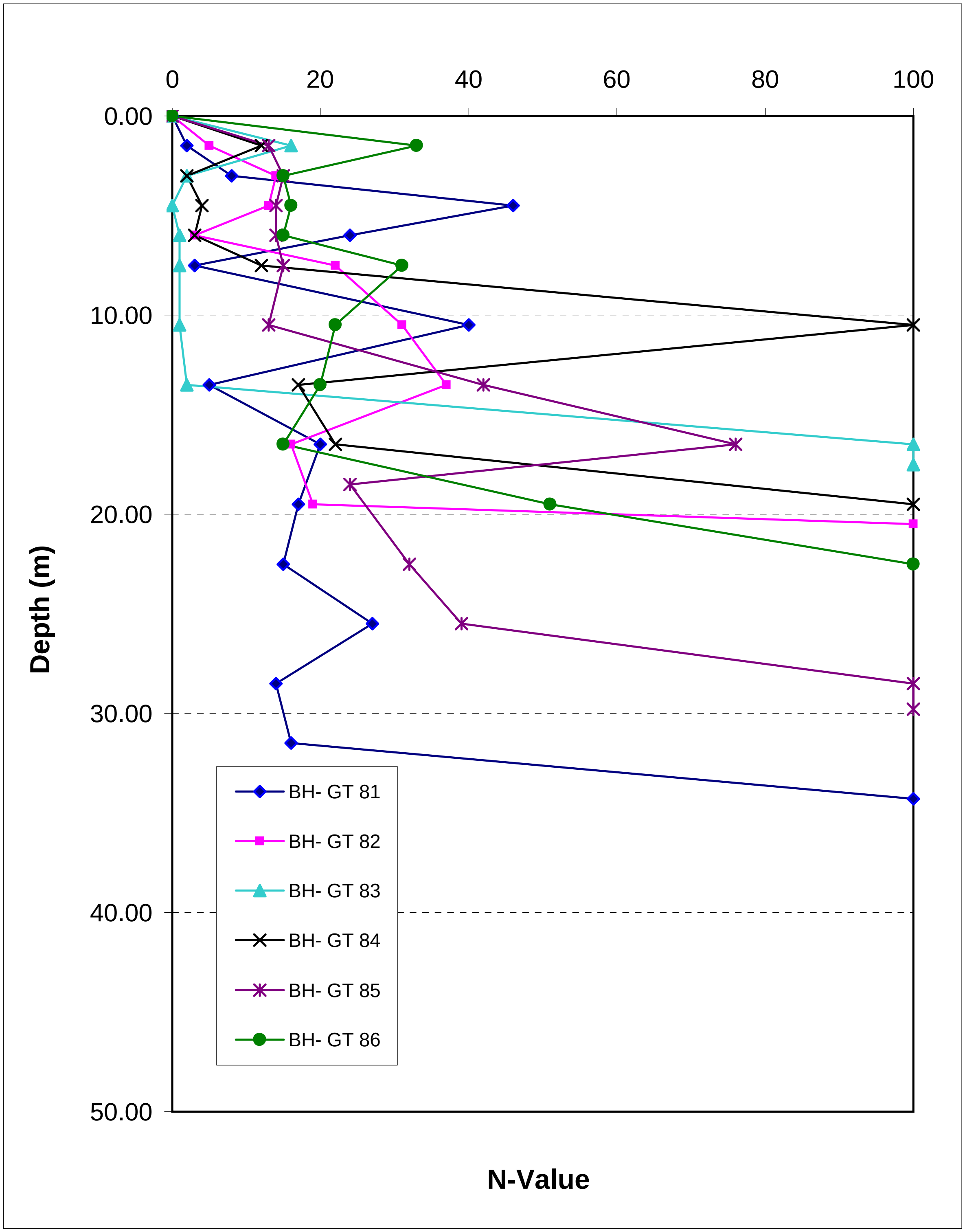


Figure 2: Distribution of Field N-Value with Depth

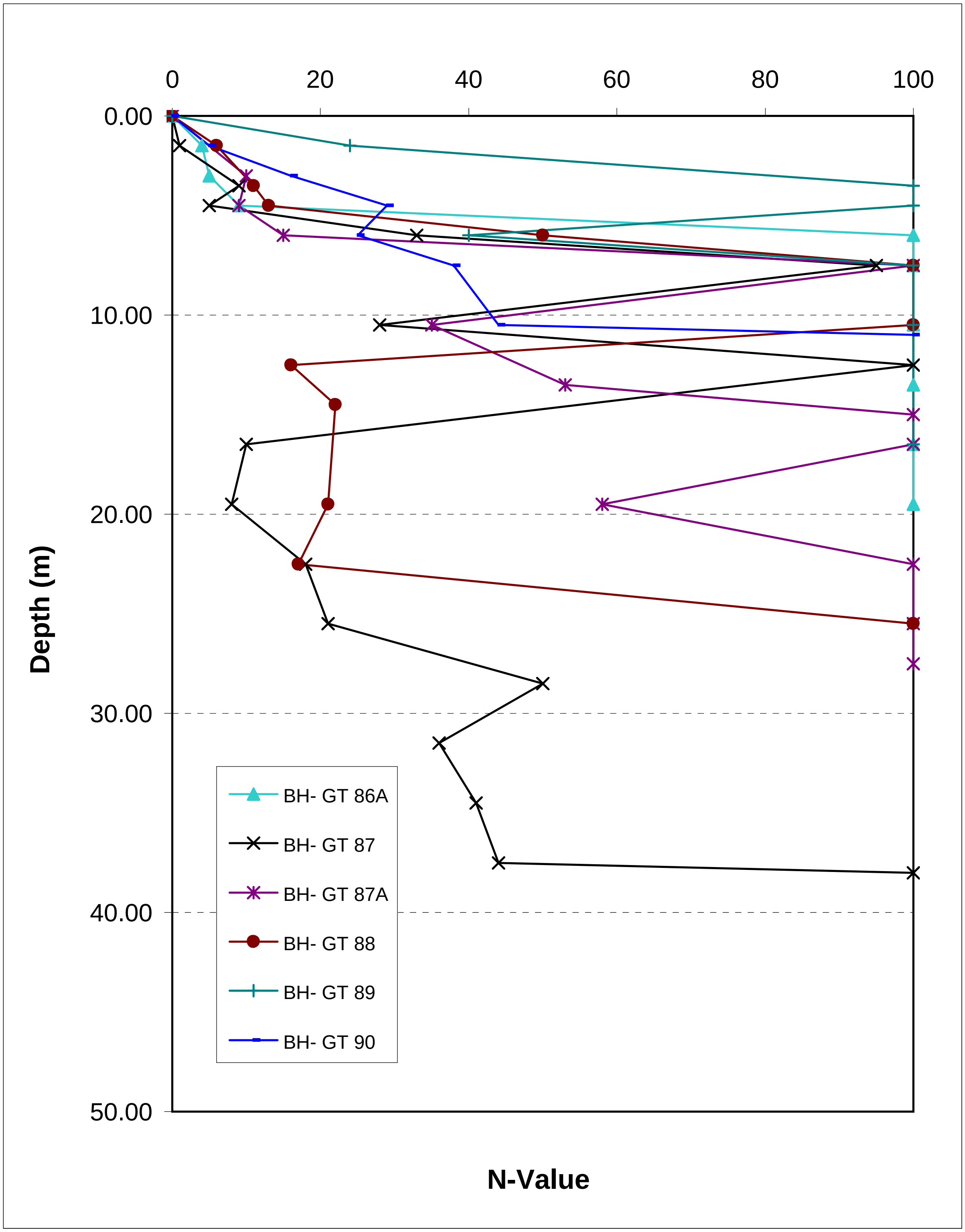


Figure 2: Distribution of Field N-Value with Depth

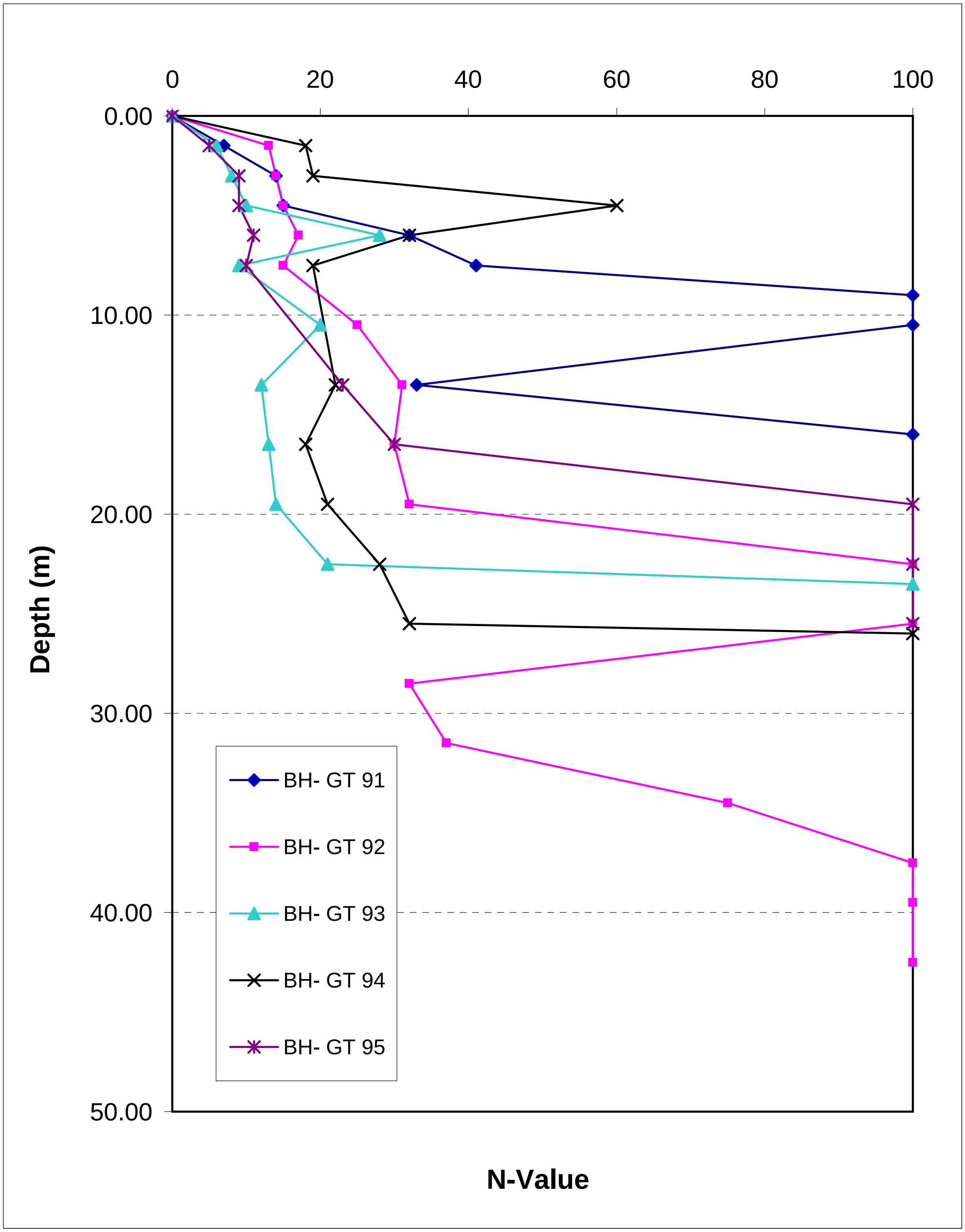


Figure 2: Distribution of Field N-Value with Depth

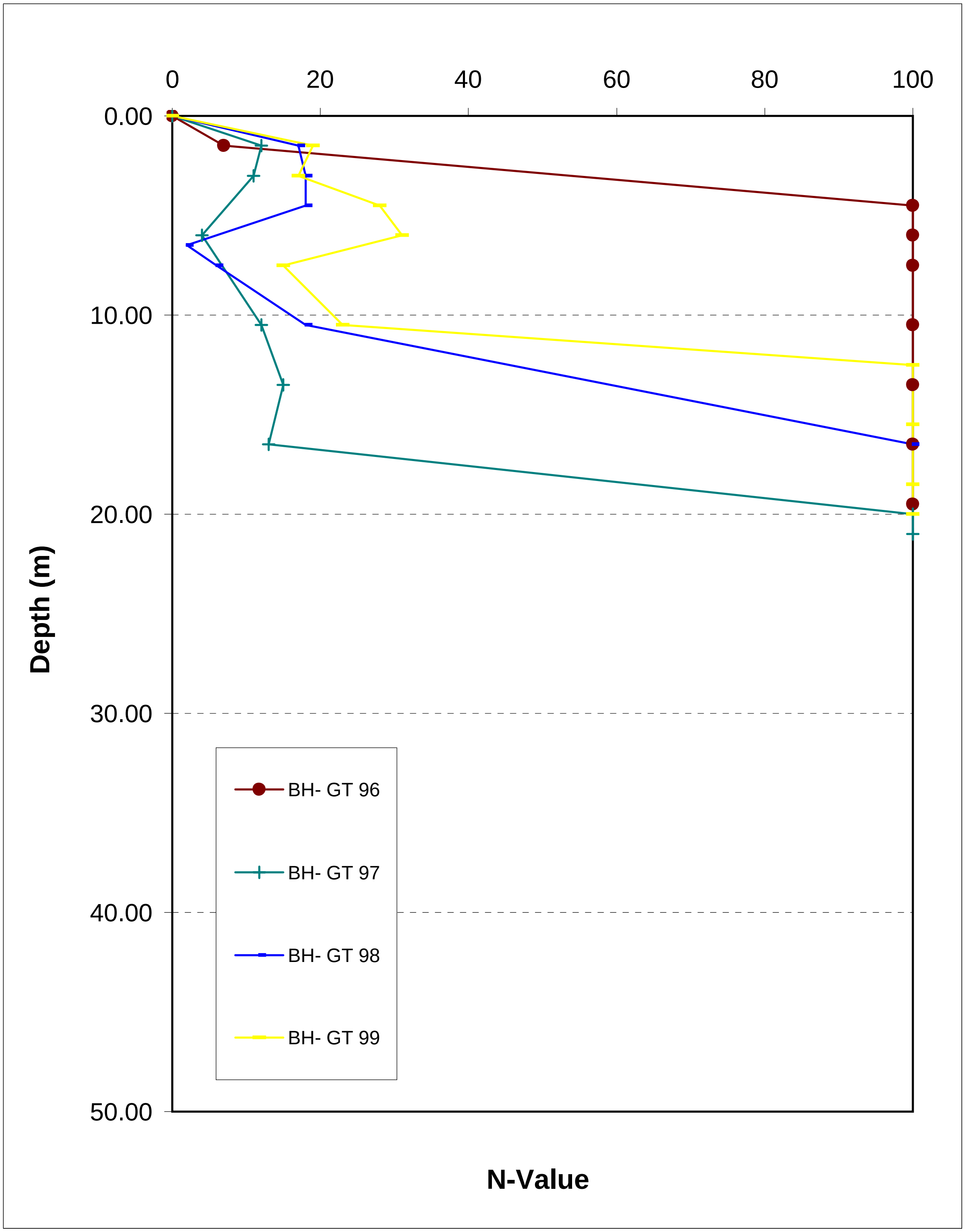
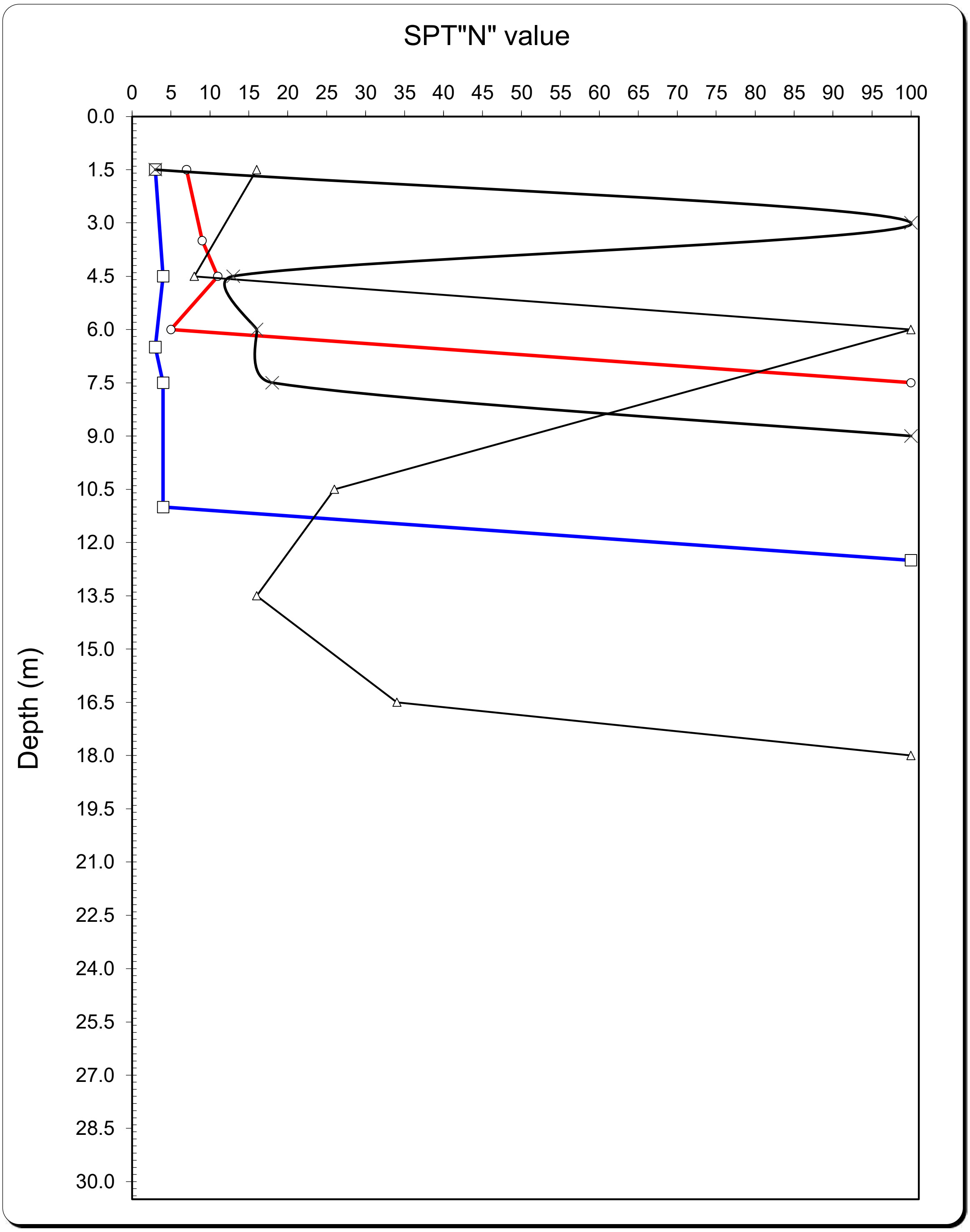


Figure 2: Distribution of Field N-Value with Depth

Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

Graphical Presentation "Depth" vs Observed SPT "N" value

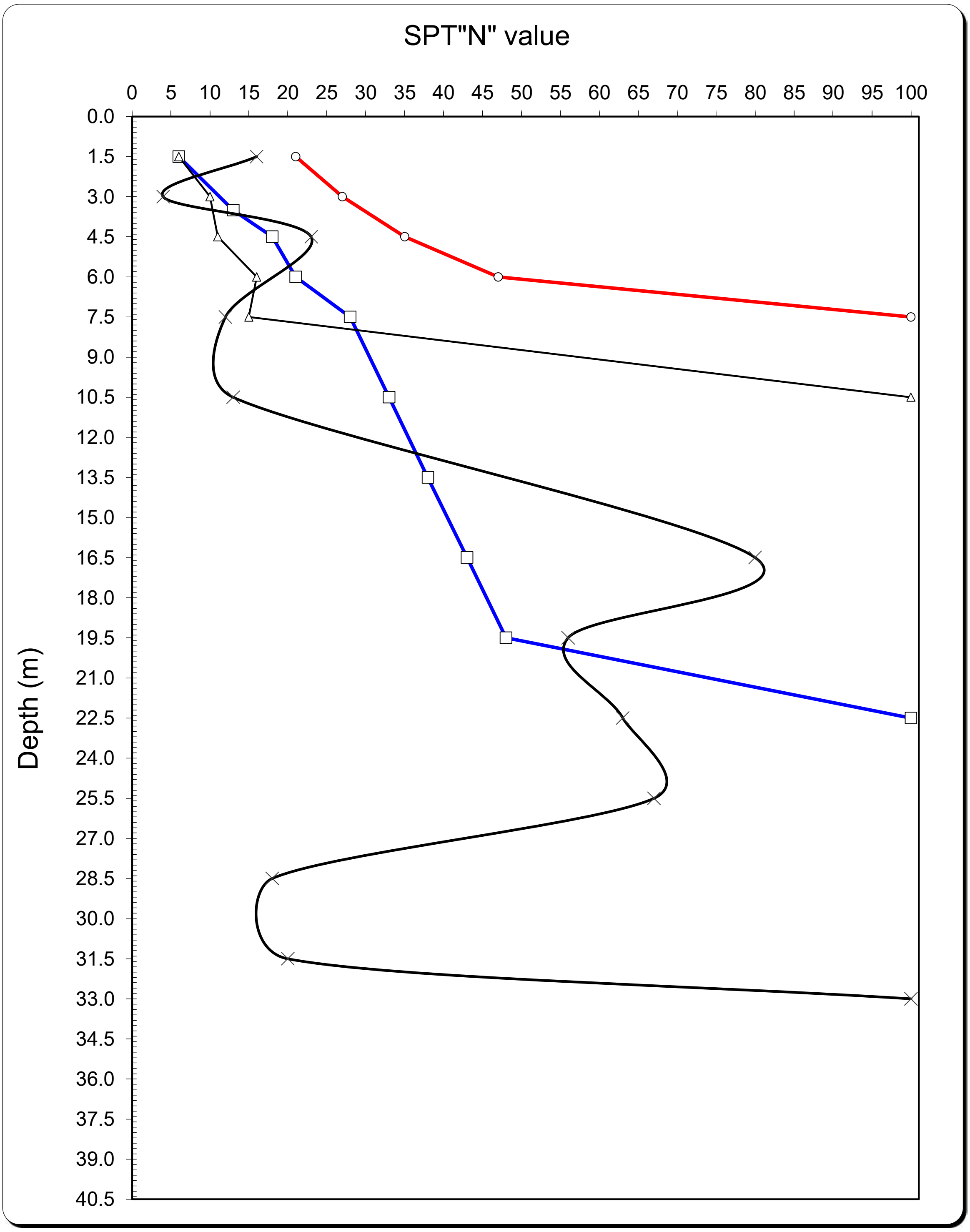


Symbol	BH No
—○—	GT 101
—□—	GT 102
—△—	GT 103A
X	GT 104

M/s ANAND RAJ INFRATECH PVT. LTD.

Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

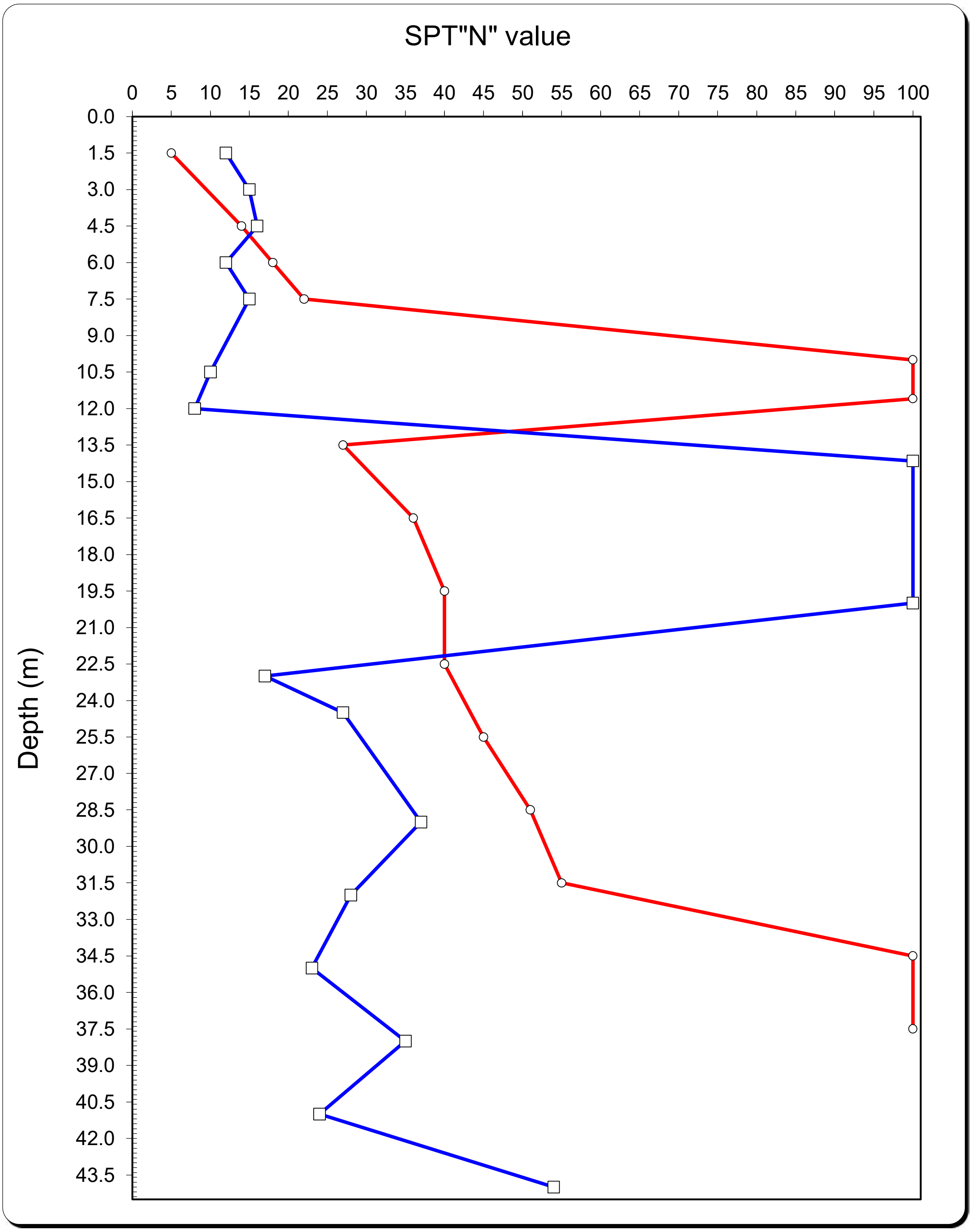
Graphical Presentation "Depth" vs Observed SPT "N" value



Symbol	BH No
—○—	GT 105A
—□—	GT 106
—△—	GT 107A
X	GT 108A

Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

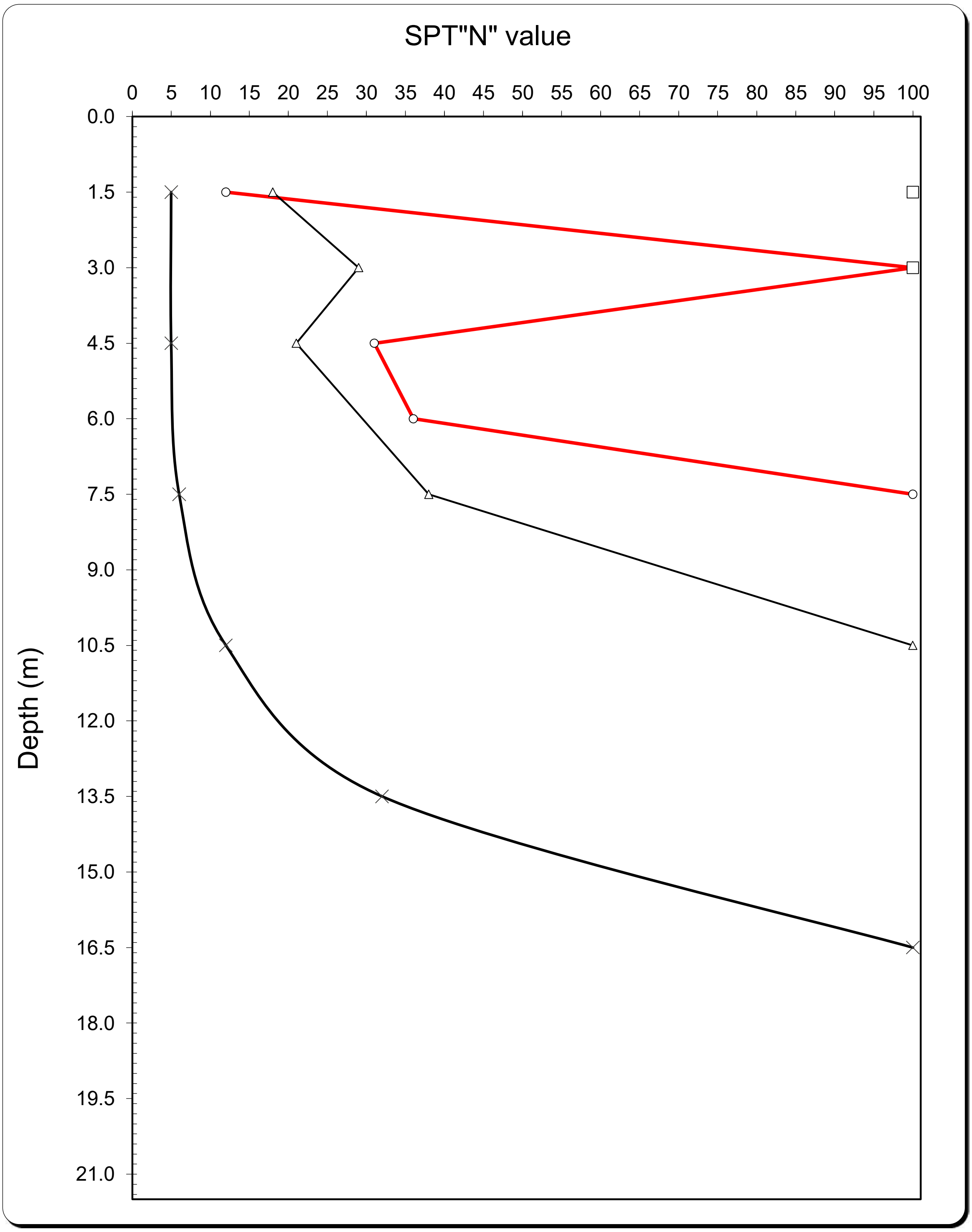
Graphical Presentation "Depth" vs Observed SPT "N" value



Symbol	BH No
─○─	GT 111A
─□─	GT 112

Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

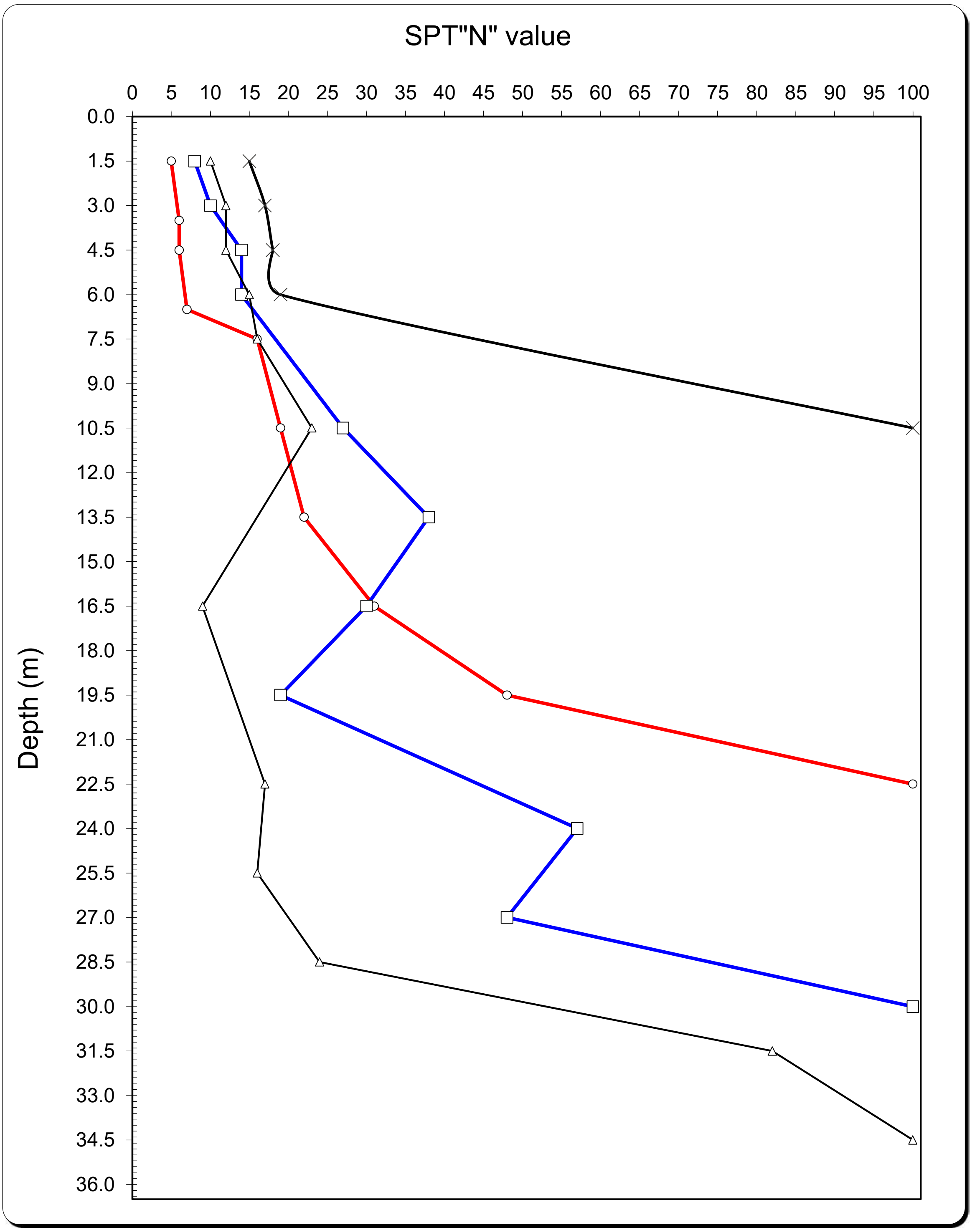
Graphical Presentation "Depth" vs Observed SPT "N" value



Symbol	BH No
—○—	GT 56A
—□—	GT 59
—△—	GT 101A
X	GT 109

Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

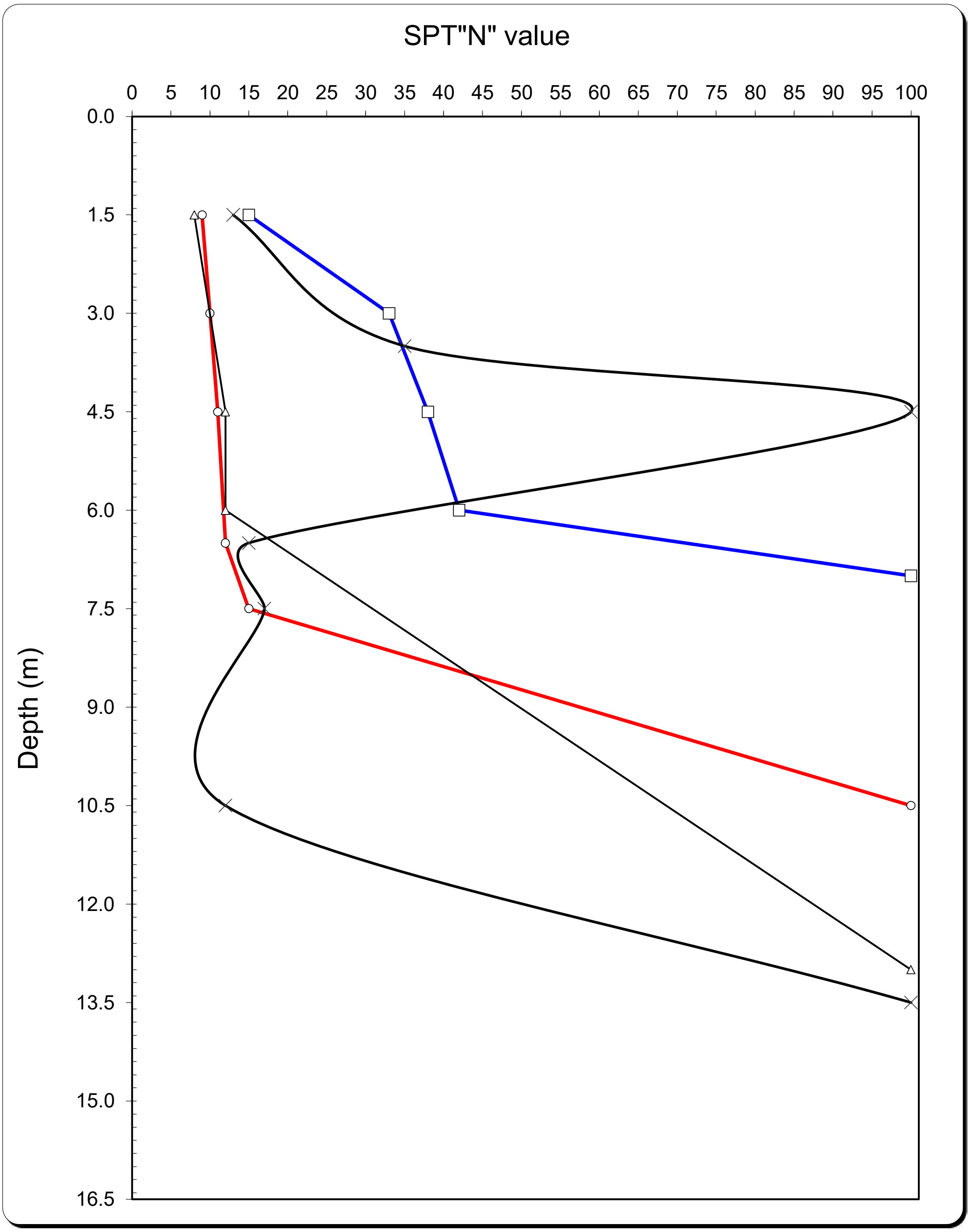
Graphical Presentation "Depth" vs Observed SPT "N" value



Symbol	BH No
—○—	GT 110
—□—	GT 113
—△—	GT 114
X	GT 115

Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

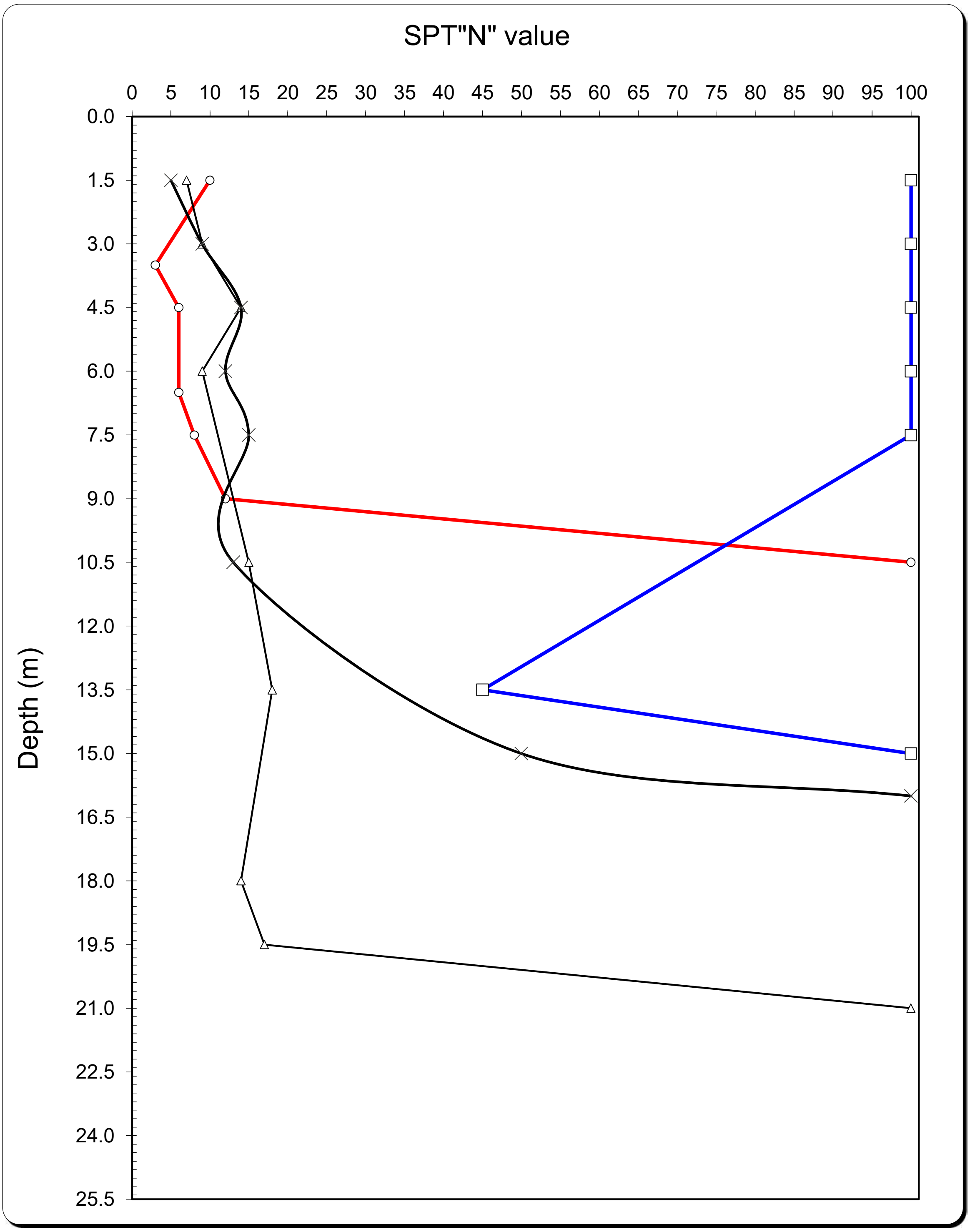
Graphical Presentation "Depth" vs Observed SPT "N" value



Symbol	BH No
○	GT 116
□	GT 117
△	GT 118
X	GT 119A

Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

Graphical Presentation "Depth" vs Observed SPT "N" value



Symbol	BH No
—○—	GT 120A
—□—	GT 121
—△—	GT 122
X	GT 123A

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 01
Location:	Chainage 0+640	Reduced Level:	3.30
Coordinates:	X - 8°30'30.06"N Y- 76°54'8.64"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	(-) 0.42 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	28.08.19 To 02.09.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								▦	Filled up with sand & gravels. 1.00m
1.00	-	-	D								░	
1.50	1.95	0.45	P	1	1	1	2				░	
3.00	3.45	0.45	P	1	3	4	7				░	Very loose to loose light bluish grey silty fine sand.
4.50	4.95	0.45	P	2	2	3	5				░	
6.00	6.45	0.45	P	1	1	2	3				░	
7.50	7.95	0.45	P	2	2	3	5				░	
9.00	9.45	0.45	P	1	1	2	3				░	
12.00	12.45	0.45	P	6	6	10	16				▒	12.00m
15.00	15.45	0.45	P	10	12	15	27				▒	Medium dense light yellowish grey silty fine to medium sand. 18.00m
18.00	18.45	0.45	P	20	51	53	>100				▓	
21.00	21.45	0.45	P	21	58 for 6 cm		>100				▓	Very dense whitish grey silty fine to medium sand traces of rock fragments.
24.00	24.45	0.45	P	35	37	52	89				▓	
24.00	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 02
Location:	Chainage 4+320	Reduced Level:	7.50
Coordinates:	X - 8°32'35.80"N Y- 76°52'28.44"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	3.39 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	11.10.19 To 12.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D									Medium dense brownish grey silty fine to medium sand.
1.00	-	-	D									
1.50	1.95	0.45	P	3	4	6	10					
3.00	3.45	0.45	P	4	6	7	13					
4.50	4.95	0.45	P	4	7	8	15					
6.00	6.45	0.45	P	5	6	8	14					
7.50	7.95	0.45	P	4	6	10	16					
10.50	10.95	0.45	P	10	10	11	21					
13.50	13.95	0.45	P	10	12	14	26					16.00m
16.50	16.95	0.45	P	100 for 10 cm			>100					Very dense brownish grey silty fine to medium sand traces of rock fragments.
19.50	19.95	0.45	P	100 for 8 cm			>100					
21.50	21.95	0.45	P	100 for 8 cm			>100					
21.50	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project: Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No: GT- 04

Location: Chainage 13+465

Reduced Level: 6.10

Coordinates: X - 8°34'49.22"N
Y- 76°51'36.30"E

Method of Boring / Drilling: Rotary

Standing Water Level: 1.65 b.g.l

Dia.of Boring / Drilling: Sx / Nx

Casing Lowered: 3.00 m

Date **:** From 09.09.19 To 10.09.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D									Loose to medium dense reddish grey silty fine to medium sand.
1.00	-	-	D									
1.50	1.95	0.45	P	2	3	3	6					
3.00	3.45	0.45	P	2	3	5	8					
4.50	4.95	0.45	P	6	7	8	15					
6.00	6.45	0.45	P	5	9	10	19					
7.50	7.95	0.45	P	8	12	15	27					7.50m Medium dense to dense brownish grey silty fine to medium sand.
10.50	10.95	0.45	P	12	21	28	49					
13.50	13.95	0.45	P	15	30	45	75					13.50m Very dense whitish grey silty fine to medium sand traces of rock fragments.
15.00	15.45	0.45	P	45	65 for 7 cm		>100					
18.00	18.45	0.45	P	38	75 for 8 cm		>100					
20.00	20.45	0.45	P	47	62 for 5 cm		>100					
20.00	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project: Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No: GT- 05

Location: Chainage 19+700

Reduced Level: 15.20

Coordinates: X - 8°39'35.17"N
Y- 76°48'14"E

Method of Boring / Drilling: Rotary

Standing Water Level: 11.80 b.g.l

Dia.of Boring / Drilling: Sx / Nx

Casing Lowered: 3.00 m

Date : From 19.09.19 To 29.09.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								░	Loose reddish grey silty fine sand calcite mixed with morrum.
1.00	-	-	D								░	
1.50	1.95	0.45	P	4	5	6	11				░	
3.00	3.45	0.45	P	3	4	5	9				░	
4.50	4.95	0.45	P	7	20	22	42				▒	4.50m Medium dense to very dense whitish grey fine to medium sand with calcite.
6.00	6.45	0.45	P	3	3	5	8				▒	
7.50	7.95	0.45	P	7	10	15	25				▒	
9.00	9.45	0.45	P	25	37	27	64				▒	
12.00	12.45	0.45	P	65	100 for 10 cm		>100				▒	
15.00	15.45	0.45	P	52	100 for 8 cm		>100				▒	
17.00	17.45	0.45	P	90	22	23	45				▒	
			CS					18.00	19.50	15 / Nil	▥	17.50m Completely to highely weathered whitish grey finly grained very weak lime stone.
			CS					21.00	22.50	27 / 14	▥	
22.50	(Termination Depth)										▥	

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 06
Location:	Chainage 22+987	Reduced Level:	3.20
Coordinates:	X - 8°41'19.20"N Y- 76°47'58.05"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	1.03 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	12.09.19 To 15.09.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D									Loose reddish yellow silty fine sand.
1.00	-	-	D									
1.50	1.95	0.45	P	2	2	2	4					
3.00	3.45	0.45	P	2	2	3	5					
4.50	4.95	0.45	P	2	3	4	7					5.30m
6.00	6.45	0.45	P	5	4	6	10					Medium dense reddish yellow silty fine to medium sand.
7.50	7.95	0.45	P	6	8	9	17					
10.50	10.95	0.45	P	8	10	12	22					
16.50	16.95	0.45	P	12	27	57	84					16.50m
18.00	18.45	0.45	P	29	55	45	100					Very dense reddish yellow silty fine to coarse sand traces of rock fragments.
21.00	21.45	0.45	P	35	52	48	100					
23.50	23.95	0.45	P	62	100 for 8 cm		>100					
23.50	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

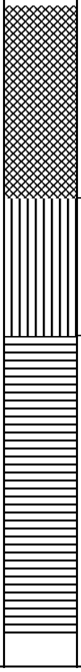
Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 07
Location:	Chainage 24+586	Reduced Level:	5.90
Coordinates:	X - 8°42'11.31"N Y- 76°47'56.59"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	4.42 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	16.09.19 To 19.09.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								▨	Stiff to very stiff reddish grey sandy silty clay with morrum.
1.00	-	-	D									
1.50	1.95	0.45	P	2	3	4	7					
3.00	3.45	0.45	U									
4.50	4.95	0.45	P	3	6	7	13					
6.00	6.45	0.45	U									
7.50	7.95	0.45	P	4	8	12	20					
10.50	10.95	0.45	P	6	12	15	27					
12.00	12.45	0.45	P	65	55 for 4 cm		>100	12.00	13.00	30 / Nil	‖	12.00m Completely to highly weathered greyish very poor and weak gneiss.
			CS					13.00	14.50	28 / 11		
			CS					14.50	16.00	86 / 71	☰	14.50m Modarately to slightely greyish weathered fine to medium grained very hard gneiss.
			CS					16.00	17.00	90 / 84		
			CS					17.00	18.00	88 / 39		
			CS					18.00	19.50	91 / 50		
19.50	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 08	
Location:	Chainage 29+022	Reduced Level:	13.00	
Coordinates:	X - 8°44'32.33"N Y- 76°48'27.56"E	Method of Boring / Drilling:	Rotary	
Standing Water Level:	12.0 b.g.l	Dia.of Boring / Drilling:	Sx / Nx	
Casing Lowered:	3.00 m	Date : From	26.02.19	To 28.02.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D									
1.00	-	-	D									Medium dense yellowish grey sandy silt with gravels.
1.50	1.45	0.45	P	8	6	12	18					
3.00	3.45	0.45	P	10	11	14	25					5.50m
5.50	5.95	0.45	P	100 for 1 cm			>100	5.50	6.50	59 / Nil		Completely to highely weathered greyish finly grained very weak stone.
			CS					6.50	7.50	60 / Nil		7.50m
			CS					7.50	8.50	83 / 56		
			CS					8.50	9.50	90 / 57		
			CS					9.50	10.50	81 / 55		Highly to modarately weathered greyish fine to medium grained moderately hard gneiss.
			CS					10.50	11.50	92 / 55		
			CS					11.50	12.50	98 / 30		
12.50	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project**:**	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No**:**	GT- 09
Location**:**	Chainage 34+890	Reduced Level**:**	82.60
Coordinates:	X - 8°47'39"N Y- 76°47'34"E	Method of Boring / Drilling**:**	Rotary
Standing Water Level**:**	79.85 b.g.l	Dia.of Boring / Drilling**:**	Sx / Nx
Casing Lowered**:**	3.00 m	Date **:** From	29.09.19 To 01.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D									Loose to medium dense silty fine to coarse sand with morrum.
1.00	-	-	D									
1.50	1.95	0.45	P	2	3	4	7					
3.00	3.45	0.45	P	5	7	20	27					
4.50	4.95	0.45	P	7	10	13	23					
6.00	6.45	0.45	P	9	11	16	27					
												7.00m
7.50	7.95	0.45	P	25	100 for 4 cm		>100					Very dense greyish silty fine to coarse sand with traces of rock fragments.
10.50	10.95	0.45	P	32	100 for 5 cm		>100					
12.50	12.95	0.45	P	10	27	25	52					
15.50	15.95	0.45	P	22	38	67	>100					
16.50	16.95	0.45	P	24	42	72	>100					
20.50	20.95	0.45	P	37	100 for 5 cm		>100					
20.50	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 10
Location:	Chainage 39+235	Reduced Level:	21.40
Coordinates:	X - 8°49'39"N Y- 76°46'50.95"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	13.95 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	17.09.19 To 23.09.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								▨	Stiff to very stiff reddish grey sandy silty clay calcite mixed with morrum.
1.00	-	-	D								▨	
1.50	1.95	0.45	P	2	3	4	7				▨	
3.00	3.45	0.45	U								▨	
4.50	4.95	0.45	P	2	3	5	8				▨	
6.00	6.45	0.45	P	3	5	6	11				▨	
7.50	7.95	0.45	P	7	13	15	28				▨	
10.50	10.95	0.45	P	10	19	25	44				░	10.50m Dense to very dense whitish grey fine to medium sand with calcite.
13.50	13.95	0.45	P	15	32	44	76				░	
14.50	14.95	0.45	P	57	100 for 4 cm		>100	14.50	15.50	21 / Nil	‖	14.50m Completely to higheley weathered whitish grey finly grained very weak lime stone.
			CS					15.50	16.50	22 / Nil	‖	
			CS					16.50	17.50	24 / Nil	‖	
			CS					17.50	18.50	23 / Nil	‖	
			CS					18.50	19.50	25 / Nil	‖	
			CS					19.50	21.00	25 / Nil	‖	
21.00	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project: Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No: GT- 11

Location: Chainage 44+776

Reduced Level: 44.40

Coordinates: X - 8°50'47.5"N
Y- 76°44'04.4"E

Method of Boring / Drilling: Rotary

Standing Water Level: 39.40 b.g.l

Dia.of Boring / Drilling: Sx / Nx

Casing Lowered: 3.00 m

Date : From 01.10.19 To 03.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								▨	Very stiff to very hard reddish yellow sandy silty laterite clay mixed with calcite.
1.00	1.45	0.45	P	8	8	12	20				▨	
2.00	2.45	0.45	P	11	16	18	34				▨	
2.50	2.95	0.45	U								▨	
3.00	3.45	0.45	P	13	20	22	42				▨	
4.50	4.95	0.45	P	15	19	27	46				▨	
6.00	6.45	0.45	P	12	25	37	62				▨	
7.50	7.95	0.45	P	18	29	40	69				▨	
10.50	10.95	0.45	P	10	20	27	47				▨	
13.50	13.95	0.45	P	10	14	19	33				▨	
16.50	16.95	0.45	P	8	18	21	39				▨	
19.50	19.95	0.45	P	9	12	17	29				▨	
22.50	22.95	0.45	P	4	5	16	21				▨	
25.50	25.95	0.45	P	7	10	27	37				▨	
28.50	28.95	0.45	P	7	12	34	46				▨	
31.50	31.95	0.45	P	6	11	24	35				▨	
			CS					33.30	34.30	57 / 49	☰	33.30m Slightly to fresh greyish fine to medium grained very hard gneiss.
			CS					34.30	35.30	84 / 74	☰	
			CS					35.30	36.30	92 / 92	☰	
			CS					36.30	37.30	82 / 82	☰	
			CS					37.30	38.30	69 / 61	☰	
38.30	(Termination Depth)										☰	

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 12
Location:	Chainage 48+755	Reduced Level:	7.10
Coordinates:	X - 8°51'24.23"N Y- 76°42'1.70"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	(-) 9.90 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	28.09.19 To 01.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D									Loose reddish yellow sandy silt.
1.50	1.45	0.45	P	2	1	1	2					
3.00	3.45	0.45	P	2	4	3	7					4.00m
4.50	4.95	0.45	P	2	2	1	3					
6.00	6.45	0.45	P	1	0	0	0					Very soft dark grey sandy silty clay.
7.50	7.95	0.45	P	1	0	0	0					
10.50	10.95	0.45	P	1	0	0	0					
13.50	13.95	0.45	P	8	9	9	18					13.40m
16.50	16.95	0.45	P	4	9	13	22					Medium dense whitish grey fine to medium sand mixed with calcite.
19.50	19.95	0.45	P	3	5	11	16					
22.50	22.95	0.45	P	3	4	6	10					
25.50	25.95	0.45	P	6	15	60	75					25.50m
28.50	28.95	0.45	P	10	17	46	63					
31.50	31.95	0.45	P	26	100	100	>100					Completely weathered greyish very poor decomposed sand stone.
34.50	34.95	0.45	P	26	35	56	91					
37.50	37.95	0.45	P	30	70	30	100					
40.50	40.95	0.45	P	14	21	81	>100					
40.50	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project: Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No: GT- 13

Location: Chainage 50+439

Reduced Level: 3.30

Coordinates: X - 8°51'50.5"N
Y- 76°41'13.5"E

Method of Boring / Drilling: Rotary

Standing Water Level: (-) 0.30 b.g.l

Dia.of Boring / Drilling: Sx / Nx

Casing Lowered: 3.00 m

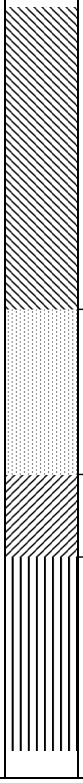
Date : From 25.09.19 **To** 30.09.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
1.00	-	-	D								▨	Loose greyish sandy clayey silt.
2.00	1.45	0.45	P	1	1	2	3				▨	
3.50	3.95	0.45	P	1	1	1	2				▨	
5.00	5.45	0.45	U								▨	
6.50	6.95	0.45	P	1	0	0	0				▨	
8.00	8.45	0.45	P	1	1	2	3				▨	10.90m
11.00	11.45	0.45	P	26	51	49	100				▥	Completely weathered greyish very poor decomposed sand stone.
14.00	14.45	0.45	P	3	11	12	23				▥	
17.00	17.45	0.45	P	24	52	50	>100				▥	
20.00	20.45	0.45	P	51	100		>100				▥	
23.00	23.45	0.45	P	67	100		>100				▥	
26.00	26.45	0.45	P	100			>100				▥	
28.70	29.15	0.45	P	100			>100				▥	
28.70	(Termination Depth)										▥	

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 14
Location:	Chainage 53+372	Reduced Level:	12.00
Coordinates:	X - 8°52'49.35"N Y- 76°39'57.95"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	12.00 b.g.l (Auifer Zone)	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From 02.10.19 To	04.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
1.00	-	-	D									
1.50	1.45	0.45	P	5	5	5	10					
3.00	3.45	0.45	P	5	100		>100					Stiff to very stiff brownish grey sandy clayey silt with gravels.
4.50	4.95	0.45	P	9	20	20	40					
6.00	6.45	0.45	P	5	8	9	17					
7.50	7.95	0.45	P	8	7	11	18					8.00m
10.50	10.95	0.45	P	18	50	45	95					
13.50	13.95	0.45	P	100			>100					Very dense brownish grey silty fine to medium sand.
16.50	16.95	0.45	P	19	100		>100					17.00m
19.50	19.95	0.45	P	22	15	28	43					Very stiff dark grey sandy silty clay with peat.
21.50	21.95	0.45	P	30	51	50	>100					21.00m
24.50	24.95	0.45	P	50	50	50	>100					Completely weathered greyish very poor decomposed sand stone.
27.00	27.45	0.45	P	30	50	51	>100					
27.00	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project: Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No: GT- 15

Location: Chainage 56+295

Reduced Level: 4.50

Coordinates: X - 8°54'12.1"N
Y- 76°39'20.8"E

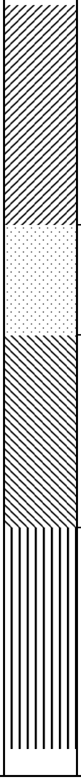
Method of Boring / Drilling: Rotary

Standing Water Level: 3.00 b.g.l

Dia.of Boring / Drilling: Sx / Nx

Casing Lowered: 3.00 m

Date : From 01.10.19 To 03.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
1.00	-	-	D									
1.50	1.45	0.45	P	2	3	6	9					Stiff yellowish grey sandy silty clay.
3.00	3.45	0.45	P	4	4	6	10					
4.50	4.95	0.45	U									
6.50	6.95	0.45	P	4	5	6	11					5.50m
7.50	7.95	0.45	P	6	8	10	18					Medium dense greyish clayey silty fine to medium sand with mica.
10.50	10.95	0.45	P	7	8	19	27					10.10m
13.50	13.95	0.45	P	8	10	12	22					Very stiff greyish sandy clayey silt with gravels.
16.50	16.95	0.45	P	4	7	9	16					
19.50	19.95	0.45	P	6	8	11	19					21.00m
22.50	22.95	0.45	P	51	50		>100					
25.50	25.95	0.45	P	57	100		>100					Completely weathered dark grey very week carboniceous sand stone.
27.50	27.95	0.45	P	54	100		>100					
27.50	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 16
Location:	Chainage 58+217	Reduced Level:	20.20
Coordinates:	X - 8°55'11.03"N Y- 76°39'30.67"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	18.70 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	01.10.19 To 03.10.19

Depth (m)				SPT : No. of blows				Run				
From	To	Length (m)	Nature of Sampling	0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)	Symbolic Profile	Description
1.00	-	-	D								▨	
1.50	1.45	0.45	P	2	2	3	5				▨	
3.00	3.45	0.45	P	2	3	3	6				▨	Firm to stiff yellowish grey sandy silty clay.
4.50	4.95	0.45	U								▨	
6.50	6.95	0.45	P	2	2	3	5				▨	
7.50	7.95	0.45	P	6	8	10	18				▨	
10.50	10.95	0.45	P	19	24	36	60				░	10.00m
13.50	13.95	0.45	P	17	26	39	65				░	
16.50	16.95	0.45	P	21	83	49	>100				░	
18.00	18.45	0.45	P	27	54	46	100				░	Very dense greyish clayey silty fine to medium sand.
21.00	21.45	0.45	P	16	29	38	67				░	
24.00	24.45	0.45	P	19	34	47	81				░	
27.00	27.45	0.45	P	47	73	27	100				▧	27.00m
30.00	30.45	0.45	P	10	18	38	56				▧	Very hard dark grey sandy clayey silt with gravels.
33.00	33.45	0.45	P	47	35	25	60				▧	
36.00	36.45	0.45	P	15	28	74	>100				▥	35.00m
39.00	39.45	0.45	P	16	52	50	>100				▥	Completely weathered dark grey very week carboniceous sand stone.
41.00	41.45	0.45	P	18	36	55	91				▥	
41.00	(Termination Depth)										▥	

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project: Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No: GT- 17

Location: Chainage 60+588

Reduced Level: 11.10

Coordinates: X - 8°56'70"N
Y- 76°40'06"E

Method of Boring / Drilling: Rotary

Standing Water Level: 9.90 b.g.l

Dia.of Boring / Drilling: Sx / Nx

Casing Lowered: 3.00 m

Date : From 19.09.19 To 21.09.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
1.00	-	-	D								▨	
1.50	1.45	0.45	P	1	1	2	3				▨	
3.00	3.45	0.45	P	1	2	2	4				▨	Soft to firm yellowish grey sandy silty clay with kankars.
4.00	4.45	0.45	U								▨	
4.50	4.95	0.45	P	1	2	4	6				▨	
6.00	6.45	0.45	P	1	1	1	2				▨	7.30m
7.50	7.95	0.45	P	20	20	28	48				░	
10.50	10.95	0.45	P	11	15	21	36				░	
13.50	13.95	0.45	P	5	9	15	24				░	
16.50	16.95	0.45	P	4	9	16	25				░	Medium dense to dense whitish grey fine to medium sand mixed with calcite.
19.50	19.95	0.45	P	8	12	16	28				░	
22.50	22.95	0.45	P	9	14	18	32				░	
25.50	25.95	0.45	P	9	14	20	34				░	
28.50	28.95	0.45	P	12	16	23	39				░	
31.50	31.95	0.45	P	10	17	24	41				░	34.50m
34.50	34.95	0.45	P	12	25	40	65				▥	
37.50	37.95	0.45	P	15	30	40	70				▥	
40.50	40.95	0.45	P	40	60	40	100				▥	Completely weathered whitish grey sand mixed with lime stone fragments.
43.50	43.95	0.45	P	45	70	30	100				▥	
43.50	(Termination Depth)										▥	

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 18
Location:	Chainage 63+421	Reduced Level:	53.80
Coordinates:	X - 8°57'46"N Y- 76°40'36"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	50.20 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	18.09.19 To 20.09.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
1.00	-	-	D								▨	
1.50	1.45	0.45	P	6	8	11	19					
2.00	2.45	0.45	U									Very stiff to very hard reddish yellow sandy silty laterite clay mixed with calcite.
3.00	3.45	0.45	P	13	18	26	44					
4.50	4.95	0.45	P	11	16	24	40					
6.00	6.45	0.45	P	9	14	23	37					
7.50	7.95	0.45	P	11	17	21	38					10.90m
10.50	10.95	0.45	P	14	23	34	57				░	
13.50	13.95	0.45	P	16	27	39	66					
16.50	16.95	0.45	P	14	23	34	57					Very dense whitish grey fine to medium sand mixed with calcite.
19.50	19.95	0.45	P	16	26	37	63					
22.50	22.95	0.45	P	22	37	42	79					
25.50	25.95	0.45	P	24	39	48	87					
28.50	28.95	0.45	P	21	31	44	75					
31.50	31.95	0.45	P	23	29	42	71					33.00m
34.50	34.95	0.45	P	22	46	54	100				▥	
37.50	37.95	0.45	P	100			>100					Completely weathered whitish grey sand mixed with lime stone fragments.
38.50	38.95	0.45	P	100			>100					
38.50	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project: Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No: GT- 19

Location: Chainage 67+090

Reduced Level: 21.00

Coordinates: X - 8°59'40.15"N
Y- 76°41'6.99"E

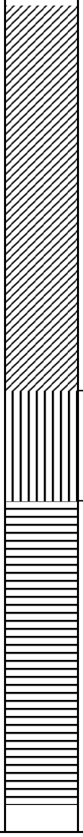
Method of Boring / Drilling: Rotary

Standing Water Level: 20.0 b.g.l

Dia.of Boring / Drilling: Sx / Nx

Casing Lowered: 3.00 m

Date : From 17.09.19 **To** 17.09.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D									Soft dark grey sandy silty clay mixed with kankars.
1.50	1.45	0.45	P	1	1	0	1					
3.00	3.45	0.45	P	1	2	1	3					
4.50	4.95	0.45	P	1	0	1	1					
6.00	6.45	0.45	P	1	1	1	2					
7.50	7.95	0.45	P	1	1	0	1					
8.00	8.45	0.45	U									
10.50	10.95	0.45	P	8	13	19	32					10.10m Completely weathered whitish grey sand mixed with lime stone fragments.
11.50	11.95	0.45	P	100	-	-	>100					
			CS					12.10	13.10	50 / 50		12.10m Moderately to slightly weathered whitish grey finely grained lime stone.
			CS					13.10	14.10	66 / 61		
			CS					14.10	15.10	70 / 23		
			CS					15.10	16.10	88 / 50		
			CS					16.10	17.10	98 / 76		
17.10	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 20
Location:	Chainage 70+030	Reduced Level:	39.60
Coordinates:	X - 9° 1'13.13"N Y- 76°40'44.51"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	36.30m b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	06.10.19 To 09.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								▧	
1.50	1.45	0.45	P	3	4	4	8				▧	Stiff reddish grey sandy clayey silt mixed with morrum gravels.
3.00	3.45	0.45	P	10	6	6	12				▧	
4.50	4.95	0.45	P	7	6	4	10				▧	
6.00	6.45	0.45	P	5	6	7	13				▧	6.50m
7.50	7.95	0.45	P	21	39	61	>100				▨	
10.50	10.95	0.45	P	33	44	56	>100				▨	
13.50	13.95	0.45	P	16	26	34	60				▨	
16.50	16.95	0.45	P	21	33	42	75				▨	Very hard whitish grey silty lime clay mixed with sand.
19.50	19.95	0.45	P	17	25	36	61				▨	
22.50	22.95	0.45	P	14	22	31	53				▨	
25.50	25.95	0.45	P	19	24	31	55				▨	28.00m
28.50	28.95	0.45	P	100	-	-	>100				▥	Completely weathered brownish grey sand mixed with lime stone fragments. 31.50m
			CS					31.75	32.75	50 / 43	▤	
			CS					32.75	33.75	50 / 31	▤	
			CS					33.75	34.50	78 / 22	▤	Highly to moderately weathered whitish grey finely grained lime stone.
			CS					34.75	35.75	50 / 10	▤	
			CS					35.75	36.75	50 / Nil	▤	
36.75	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project: Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No: GT- 21

Location: Chainage 70+740

Reduced Level: 3.60

Coordinates: X - 9° 1'35.58"N
Y- 76°40'39.18"E

Method of Boring / Drilling: Rotary

Standing Water Level: 3.20 b.g.l

Dia.of Boring / Drilling: Sx / Nx

Casing Lowered: 3.00 m

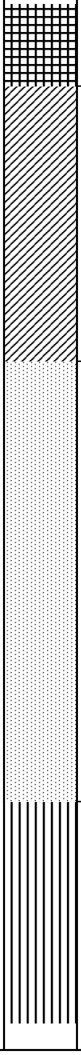
Date : From 03.09.19 To 04.09.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								▨	Soft dark grey sandy silty clay mixed with kankars.
1.50	1.45	0.45	P	1	0	1	1				▨	
3.00	3.45	0.45	P	1	1	1	2				▨	
4.50	4.95	0.45	P	1	2	1	3				▨	
6.00	6.45	0.45	P	6	8	10	18				▨	
9.00	9.45	0.45	P	7	9	12	21				▨	
11.50	11.95	0.45	P	5	7	7	14				▨	
			CS					12.40	13.40	74 / 74	≡	12.40m Moderately to fresh greyish fine to medium grained very hard gneiss.
			CS					13.40	14.40	72 / 68	≡	
			CS					14.40	15.40	68 / 54	≡	
			CS					15.40	16.40	48 / 46	≡	
			CS					16.40	17.40	52 / 21	≡	
17.40	(Termination Depth)										≡	

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 22
Location:	Chainage 74+804	Reduced Level:	39.00
Coordinates:	X - 9° 3'45.04"N Y- 76°40'22.07"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	8.10 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	05.09.19 To 06.09.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
1.00	-	-	D									Filled up meterials.
1.50	-	-	D									2.00m
3.00	3.45	0.45	P	7	7	7	14					
4.00	4.45	0.45	U									Stiff to very stiff reddish grey sandy silty clay mixed with morrum.
4.50	4.95	0.45	P	5	6	8	14					
6.00	6.45	0.45	P	6	8	9	17					
7.50	7.95	0.45	P	8	7	11	18					9.50m
10.50	10.95	0.45	P	15	35	38	73					
13.50	13.95	0.45	P	20	27	32	59					
16.50	16.95	0.45	P	25	33	37	70					
19.50	19.95	0.45	P	11	24	31	55					Very dense whitish grey coarse sand mixed with calcite.
22.50	22.95	0.45	P	16	21	23	44					
25.50	25.95	0.45	P	15	25	31	56					
28.50	28.95	0.45	P	11	26	29	55					
31.50	31.95	0.45	P	16	24	37	61					33.00m
34.50	34.95	0.45	P	25	43	58	>100					
37.50	37.95	0.45	P	27	48	42	90					Completely weathered whitish grey sand mixed with lime stone fragments.
40.50	40.95	0.45	P	26	44	56	100					
40.50	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project: Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No: GT- 23

Location: Chainage 78+735

Reduced Level: 15.90

Coordinates: X - 9°05'51"N
Y- 76°40'26"E

Method of Boring / Drilling: Rotary

Standing Water Level: 11.40 b.g.l

Dia.of Boring / Drilling: Sx / Nx

Casing Lowered: 3.00 m

Date : From 03.09.19 To 06.09.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								▨	Firm to very stiff dark grey sandy silty clay mixed with kankars.
1.50	1.45	0.45	P	9	11	15	26					
3.00	3.45	0.45	P	7	9	9	18					
4.50	4.95	0.45	P	5	5	7	12					
6.00	6.45	0.45	U									
7.50	7.95	0.45	P	2	2	3	5					
10.50	10.95	0.45	P	3	3	4	7					
13.50	13.95	0.45	P	6	10	13	23					
16.50	16.95	0.45	P	18	20	18	38					
												18.00m
			CS					19.00	20.00	65 / 55	☰	Moderately to fresh greyish fine to medium grained very hard gneiss.
			CS					20.00	21.00	80 / 36		
			CS					21.00	22.00	83 / 10		
			CS					22.00	23.00	91 / 81		
			CS					23.00	24.00	85 / 79		
			CS					24.00	25.00	82 / 55		
			CS					25.00	26.00	71 / 43		
			CS					26.00	27.00	81 / 45		
27.00	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 24
Location:	Chainage 85+742	Reduced Level:	3.70
Coordinates:	X - 9°09'17"N Y- 76°38'48"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	(-) 1.60 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	04.09.19 To 07.09.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								▦	Filled up meterials.
1.50	-	-	D								▦	2.00m
2.00	2.45	0.45	U								▨	
3.00	3.45	0.45	P	25	25	26	51				▨	
4.50	4.95	0.45	P	9	14	17	31				▨	
6.00	6.45	0.45	P	5	11	14	25				▨	Very stiff to very hard reddish yellow sandy silty clay with morrum.
7.50	7.95	0.45	P	2	6	8	14				▨	
10.50	10.95	0.45	P	11	14	39	53				▨	
13.50	13.95	0.45	P	8	14	18	32				▨	15.00m
16.50	16.95	0.45	P	34	60	79	>100				‖	
19.50	19.95	0.45	P	19	25	40	65				‖	
22.50	22.95	0.45	P	75	100		>100				‖	Completely weathered whitish grey sand mixed with lime stone fragments.
25.50	25.95	0.45	P	100			>100				‖	
27.50	27.95	0.45	P	100			>100				‖	
27.50	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 25
Location:	Chainage 88+262	Reduced Level:	29.40
Coordinates:	X - 9°10'31.61"N Y- 76°38'17.24"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	22.40 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	07.10.19 To 08.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
1.00	-	-	D								▦	Filled up meterials.
1.50	1.95	0.45	P	8	12	16	28				▨	1.20m
3.00	3.45	0.45	P	11	18	18	36					
4.50	4.95	0.45	P	6	9	13	22					
5.00	5.45	0.45	U									
6.00	6.45	0.45	P	8	13	15	28					Very stiff to hard reddish yellow silty laterite clay mixed with calcite.
7.50	7.95	0.45	P	5	14	19	33					
10.50	10.95	0.45	P	4	9	14	23					
13.50	13.95	0.45	P	7	9	15	24					
16.50	16.95	0.45	P	10	15	18	33					
19.50	19.95	0.45	P	9	13	25	38					
22.50	22.95	0.45	P	16	24	56	80				▥	21.50m
25.50	25.95	0.45	P	15	25	29	54					
28.50	28.95	0.45	P	24	43	57	100					Completely weathered whitish grey sand mixed with lime stone fragments.
31.50	31.95	0.45	P	30	52	48	100					
33.50	33.95	0.45	P	70	100	58	>100					
33.50	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project: Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No: GT- 26

Location: Chainage 91+816

Reduced Level: 5.10

Coordinates: X - 9°12'26.55"N
Y- 76°38'31.78"E

Method of Boring / Drilling: Rotary

Standing Water Level: 4.80 b.g.l

Dia.of Boring / Drilling: Sx / Nx

Casing Lowered: 3.00 m

Date : From 08.10.19 To 09.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								▨	Firm to very stiff reddish yellow sandy silty clay with morrum.
1.50	1.95	0.45	P	3	3	5	8				▨	
2.00	2.45	0.45	U								▨	
3.00	3.45	0.45	P	2	2	4	6				▨	
4.50	4.95	0.45	P	2	3	1	4				▨	
6.00	6.45	0.45	P	1	3	2	5				▨	
7.50	7.95	0.45	P	3	6	16	22				▨	
10.50	10.95	0.45	P	2	2	6	8				▨	
13.50	13.95	0.45	P	31	49	51	100				▥	13.50m Completely weathered whitish grey sand mixed with lime stone fragments.
16.50	16.95	0.45	P	51	100		>100				▥	
18.50	18.95	0.45	P	100			>100				▥	
18.50	(Termination Depth)										▥	

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project: Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No: GT- 27

Location: Chainage 95+090

Reduced Level: 5.30

Coordinates: X - 9°14'12.7"N
Y- 76°38'41.6"E

Method of Boring / Drilling: Rotary

Standing Water Level: 1.60 b.g.l

Dia.of Boring / Drilling: Sx / Nx

Casing Lowered: 3.00 m

Date : From 07.10.19 To 08.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								▨	Firm reddish yellow sandy silty clay with morrum.
1.50	1.45	0.45	P	1	1	1	2					
3.00	3.45	0.45	P	3	4	4	8					
4.50	4.95	0.45	P	2	2	1	3					
6.00	6.45	0.45	P	1	2	1	3					
7.50	7.95	0.45	P	2	2	3	5					
10.50	10.95	0.45	U									
13.50	13.95	0.45	P	18	29	44	73				▥	13.00m Completely weathered whitish grey sand mixed with lime stone fragments.
16.50	16.95	0.45	P	8	10	13	23					
			CS					18.50	19.50	70 / 62	▤	18.50m Moderately to fresh greyish fine to medium grained very hard gneiss.
			CS					19.50	20.50	75 / 71		
			CS					20.50	21.50	94 / 87		
			CS					21.50	22.50	58 / 51		
			CS					22.50	23.50	51 / 44		
23.50	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 28
Location:	Chainage 99+766	Reduced Level:	7.90
Coordinates:	X - 9°16'38.9"N Y- 76°38'20.5"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	6.40 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From 03.10.19 To	10.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D									
1.50	1.95	0.45	P	1	2	1	3					Loose dark grey clayey silty sand.
3.00	3.45	0.45	P	3	2	3	5					
4.50	4.95	0.45	P	6	5	4	9					
6.00	6.45	0.45	P	3	8	4	12					7.50m
7.50	7.95	0.45	P	100			>100					
10.50	10.95	0.45	P	100			>100					Completely weathered whitish grey sand mixed with lime stone fragments.
13.50	13.95	0.45	P	100			>100					
15.00	15.45	0.45	P	100			>100					
15.00	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 29
Location:	Chainage 105+030	Reduced Level:	2.90
Coordinates:	X - 9°19'46.7"N Y- 76°38'42.2"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	(-) 6.80 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	04.10.19 To 05.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								▨	Firm reddish grey sandy silty clay with calcareous nodules.
1.50	1.95	0.45	P	1	1	4	5					
3.00	3.45	0.45	P	19	29	50	79				░	3.00m Dense to very dense brownish grey silty fine to medium sand traces of gravels.
4.50	4.95	0.45	P	14	24	34	58					
6.00	6.45	0.45	P	16	22	24	46					
7.50	7.95	0.45	P	12	20	23	43					
10.50	10.95	0.45	P	15	18	22	40					
13.50	13.95	0.45	P	13	19	22	41					
16.50	16.95	0.45	P	11	17	20	37					
19.50	19.95	0.45	P	14	19	24	43					
22.50	22.95	0.45	P	22	43	57	>100				▥	22.50m Completely weathered whitish grey sand mixed with lime stone fragments.
25.50	25.95	0.45	P	47	100		>100					
27.50	27.95	0.45	P	100			>100					
27.50	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 30
Location:	Chainage 108+900	Reduced Level:	7.50
Coordinates:	X - 9°21'37"N Y- 76°38'42.2"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	2.50 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	30.09.19 To 01.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								▨	Stiff to very stiff brownish grey clayey silty sand with traces of gravels.
1.50	1.45	0.45	P	3	5	7	12				▨	
3.00	3.45	0.45	P	5	6	9	15				▨	
4.50	4.95	0.45	P	5	7	10	17				▨	
6.00	6.45	0.45	P	5	10	12	22				▨	
7.50	7.95	0.45	P	7	11	11	22				▨	
10.50	10.95	0.45	P	5	6	6	12				▨	
13.00	13.45	0.45	P	100 for 12 cm			>100	13.00	14.00	90 / Nil	☰	13.00m Moderately to slightly weathered greyish fine to medium grained strong metamorphic rock.
			CS					14.00	15.00	92 / 60	☰	
			CS					15.00	16.00	71 / 50	☰	
			CS					16.00	17.00	90 / 90	☰	
			CS					17.00	18.00	86 / 69	☰	
			CS					18.00	19.00	99 / 55	☰	
19.00	(Termination Depth)										☰	

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 31
Location:	Chainage 113+000	Reduced Level:	3.20
Coordinates:	X - 9°23'39.87"N Y- 76°37'43.17"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	(-) 1.50 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From 15.10.19 To	17.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								▨	Firm to stiff reddish grey sandy silty clay with traces of gravels.
1.50	1.45	0.45	P	4	5	10	15					
3.00	3.45	0.45	P	5	8	11	19					
4.50	4.95	0.45	P	1	2	2	4					
6.00	6.45	0.45	P	1	2	4	6					
7.50	7.95	0.45	P	2	3	4	7					
10.50	10.95	0.45	P	2	3	5	8					
13.50	13.95	0.45	P	5	6	6	12					
16.50	16.95	0.45	P	10	17	22	39				░	16.50m Very dense greyish fine to medium sand with gravels traces of rock fragments.
19.50	19.95	0.45	P	100 for 10 cm			>100					
22.50	22.95	0.45	P	100 for 8 cm			>100					
24.50	24.95	0.45	P	100 for 6 cm			>100					
24.50	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 32
Location:	Chainage 118+048	Reduced Level:	16.30
Coordinates:	X - 9°26'23"N Y- 76°37'13"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	12.40 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	02.10.19 To 04.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								░	Medium dense brownish grey silty fine to medium sand with gravels.
1.50	1.45	0.45	P	4	6	9	15				░	
3.00	3.45	0.45	P	5	10	13	23				░	3.50m
4.50	4.95	0.45	P	2	2	3	5				▨	Firm to stiff reddish grey sandy silty clay with gravels.
6.00	6.45	0.45	P	4	6	6	12				▨	7.50m
7.50	7.95	0.45	P	100 for 2 cm			>100	7.50	8.50	81 / 70	☰	
								8.50	9.50	100 / 99	☰	
								9.50	11.00	93 / 78	☰	Moderately to slightly weathered greyish fine to medium grained hard metamorphic rock.
								11.00	12.00	80 / 68	☰	
								12.00	13.00	92 / 90	☰	
13.00	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 33
Location:	Chainage 123+120	Reduced Level:	26.70
Coordinates:	X - 9°28'49"N Y- 76°35'58"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	23.10 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From 04.10.19	To 06.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								▨	Stiff to very stiff reddish grey clayey sandy silt with traces of gravels.
1.50	1.45	0.45	P	3	5	7	12				▨	
3.00	3.45	0.45	P	8	11	14	25				▨	
4.50	4.95	0.45	P	10	12	16	28				▨	
6.00	6.45	0.45	P	5	6	8	14				▨	
7.50	7.95	0.45	P	6	6	10	16				▨	
10.50	10.95	0.45	P	8	10	12	22				▨	
13.50	13.95	0.45	P	12	13	16	29				▨	
												14.00m
								14.00	15.00	75 / 60	▤	Moderately to slightly weathered greyish fine to medium grained hard metamorphic rock.
								15.00	16.00	82 / 68	▤	
								16.00	17.00	86 / 60	▤	
								17.00	18.00	89 / 72	▤	
								18.00	19.00	90 / 90	▤	
19.00	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project: Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Location: Chainage 129+588

Coordinates: X - 9°21'37"N
Y- 76°33'45"E

Standing Water Level: 0.00 b.g.l

Casing Lowered: 3.00 m

Bore Hole No: GT- 34

Reduced Level: 5.60

Method of Boring / Drilling: Rotary

Dia.of Boring / Drilling: Sx / Nx

Date : From 03.10.19 To 05.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								░	
1.50	1.45	0.45	P	4	6	9	15				░	Medium dense brownish grey silty fine to medium sand with gravels.
3.00	3.45	0.45	P	5	7	10	17				░	
4.50	4.95	0.45	P	5	7	9	16				░	
												5.50m
6.00	6.45	0.45	P	3	4	5	9				▧	
7.50	7.95	0.45	P	4	5	6	11				▧	Stiff to very stiff greyish clayey sandy silt with gravels.
10.50	10.95	0.45	P	3	4	5	9				▧	
13.50	13.95	0.45	P	5	10	10	20				▧	
												16.50m
16.50	16.95	0.45	P	100 for 10 cm			>100	16.50	17.50	85 / 66	☰	
								17.50	18.50	84 / 62	☰	
								18.50	19.50	85 / 68	☰	Moderately to slightly weathered brownish grey fine to medium grained hard metamorphic rock.
								19.50	20.50	90 / 85	☰	
								20.50	21.50	90 / 86	☰	
21.50	(Termination Depth)										☰	

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project: Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No: GT- 35

Location: Chainage 133+605

Reduced Level: 3.00

Coordinates: X - 9°33'13.4"N
Y- 76°32'30.2"E

Method of Boring / Drilling: Rotary

Standing Water Level: (-) 1.40 b.g.l

Dia.of Boring / Drilling: Sx / Nx

Casing Lowered: 3.00 m

Date : From 06.10.19 To 06.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								▨	Stiff to very stiff reddish grey sandy silty clay traces of gravels.
1.50	1.45	0.45	P	5	9	12	21					
3.00	3.45	0.45	P	6	12	19	31					
4.50	4.95	0.45	P	7	14	21	35					
6.00	6.45	0.45	P	6	12	18	30					
7.50	7.95	0.45	P	7	15	19	34					
10.50	10.95	0.45	P	5	10	19	29					
13.50	13.95	0.45	P	100 for 10 cm			>100				░	13.50m Very dense silty fine to medium sand with gravels traces of rock fragments.
16.50	16.95	0.45	P	100 for 9 cm			>100					
18.50	18.95	0.45	P	100 for 5 cm			>100					
18.50	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project: Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No: GT- 36

Location: Chainage 136+780

Reduced Level: 9.20

Coordinates: X - 9°34'55.4"N
Y- 76°32'16.9"E

Method of Boring / Drilling: Rotary

Standing Water Level: 4.45 b.g.l

Dia.of Boring / Drilling: Sx / Nx

Casing Lowered: 3.00 m

Date : From 03.10.19 To 04.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
								0.00	1.00	73 / 52	▤	Moderately to slightly weathered greyish fine to medium grained hard metamorphic rock.
								1.00	2.00	84 / 81	▤	
								2.00	3.50	77 / 55	▤	
								3.50	5.00	83 / 74	▤	
5.00	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 36B
Location:	Chainage 137+260	Reduced Level:	33.10
Coordinates:	X - 9°35'11"N Y- 76°32'17"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	29.60 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From 28.10.19 To	30.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								▨	Very stiff to hard reddish grey sandy clayey silt with gravels.
1.50	1.45	0.45	P	6	10	12	22				▨	
3.00	3.45	0.45	P	22	25	31	56				▨	
												4.00m
4.50	4.95	0.45	P	100 for 10 cm			>100				░	Very dense silty fine to medium sand with gravels traces of rock fragments.
6.00	6.45	0.45	P	100 for 9 cm			>100				░	
												7.50m
7.50	7.95	0.45	P	100 for 1 cm			>100	7.50	8.50	84 / 62	☰	
								8.50	9.50	96 / 86	☰	
								9.50	11.00	71 / 54	☰	Moderately to slightly weathered greyish fine to medium grained hard metamorphic rock.
								11.00	12.50	73 / 57	☰	
12.50	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project: Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.
Bore Hole No: GT- 37
Location: Chainage 138+455
Reduced Level: 21.60
Coordinates: X - 9°35'48.73"N
Y- 76°32'19.26"E
Method of Boring / Drilling: Rotary
Standing Water Level: 16.80 b.g.l
Dia.of Boring / Drilling: Sx / Nx
Casing Lowered: 3.00 m
Date : From 04.10.19 **To** 04.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								░	
1.50	1.45	0.45	P	3	4	6	10				░	Medium dense brownish grey silty fine to medium sand with gravels.
3.00	3.45	0.45	P	4	5	5	10				░	
4.50	4.95	0.45	P	2	2	2	4				▨	4.50m
6.00	6.45	0.45	U								▨	
7.50	7.95	0.45	P	2	2	3	5				▨	Firm dark grey silty clay with decomposed matter.
9.00	9.45	0.45	U								▨	
10.50	10.95	0.45	P	3	4	4	8				▨	13.50m
13.50	13.95	0.45	P	4	5	6	11				▩	
15.00	15.45	0.45	P	5	6	7	13				▩	Stiff to very stiff dark grey clayey silty sand with gravels.
16.50	16.95	0.45	P	5	7	8	15				▩	
18.00	18.45	0.45	P	7	9	12	21				▩	
20.00	20.45	0.45	P	27	49	52	>100	20.00	21.00	80 / 58	☰	20.00m
								21.00	22.00	74 / 74	☰	
								22.00	23.50	98 / 85	☰	Moderately to slightly weathered greyish fine to medium grained hard metamorphic rock.
								23.50	25.00	72 / 66	☰	
25.00	(Termination Depth)										☰	

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 38
Location:	Chainage 140+180	Reduced Level:	7.60
Coordinates:	X - 9°36'34.4"N Y- 76°32'49.2"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	4.30 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	08.10.19 To 11.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								▨	Firm to stiff reddish grey sandy clayey silt with traces of gravels.
1.50	1.45	0.45	P	2	2	2	4					
3.00	3.45	0.45	P	2	3	3	6					
4.50	4.95	0.45	P	6	9	11	20				░	4.50m Medium dense brownish grey silty fine to medium sand with gravels.
6.00	6.45	0.45	P	7	10	14	24					
7.50	7.95	0.45	P	7	11	15	26					
10.50	10.95	0.45	P	8	13	18	31					
13.50	13.95	0.45	P	6	9	10	19					
16.50	16.95	0.45	P	7	11	13	24					
19.50	19.95	0.45	P	6	8	8	16					
22.00	22.45	0.45	P	7	61 for 7 cm		>100				▒	22.00m Very dense greyish fine to medium sand with gravels traces of rock fragments.
25.00	25.45	0.45	P	100 for 10 cm			>100					
27.00	27.45	0.45	P	100 for 4 cm			>100					
27.00	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 39
Location:	Chainage 144+020	Reduced Level:	4.70
Coordinates:	X - 9°38'21"N Y- 76°33'56.17"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	(-) 0.65 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	19.10.19 To 21.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								▨	Stiff reddish grey sandy silty clay with morrum.
												1.00m
1.50	1.45	0.45	P	100 for 3 cm			>100				░	Dense to very dense reddish grey silty fine to medium sand with morrum.
3.00	3.45	0.45	P	100 for 4 cm			>100				░	
4.50	4.95	0.45	P	100 for 3 cm			>100				░	
6.00	6.45	0.45	P	7	12	18	30				░	
7.50	7.95	0.45	P	11	17	25	42				░	
												8.00m
8.00	8.45	0.45	P	100 for 3 cm			>100	8.00	9.00	82 / 72	☰	Moderately to slightly weathered greyish fine to medium grained hard metamorphic rock.
								9.00	10.00	83 / 61	☰	
								10.00	11.50	85 / 72	☰	
								11.50	13.00	90 / 83	☰	
13.00	(Termination Depth)										☰	

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project: Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No: GT- 40

Location: Chainage 148+168

Reduced Level: 23.80

Coordinates: X - 9°40'32"N
Y- 76°34'10"E

Method of Boring / Drilling: Rotary

Standing Water Level: 20.70 b.g.l

Dia.of Boring / Drilling: Sx / Nx

Casing Lowered: 3.00 m

Date : From 19.10.19 To 20.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								▨	Very stiff reddish grey clayey sandy silt with morrum.
1.50	1.45	0.45	P	7	6	10	16				▨	
3.00	3.45	0.45	P	10	50		>100	3.00	4.50	68 / 63	▤	3.00m
								4.50	6.00	91 / 90	▤	Slightly weathered greyish fine to medium grained very strong sand stone.
								6.00	7.00	84 / 56	▤	
								7.00	8.00	91 / 87	▤	
8.00	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 41
Location:	Chainage 153+980	Reduced Level:	23.60
Coordinates:	X - 9°43'25.47"N Y- 76°32'55.64"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	20.98 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From 08.10.19	To 09.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								▨	Hard reddish grey sandy clayey silt morrum mixed with gravels.
1.50	1.45	0.45	P	12	16	20	36				▨	
3.00	3.45	0.45	P	4	25	30	55				▨	
4.50	4.95	0.45	P	6	12	25	37				▨	
6.00	6.45	0.45	P	8	14	27	41				▨	
7.50	7.95	0.45	P	10	16	28	44				▨	
10.50	10.95	0.45	P	14	23	33	56				▨	
13.50	13.95	0.45	P	27	48	52	100				░	13.50m Very dense brownish grey silty fine to coarse sand with gravels traces of rock fragments.
16.50	16.95	0.45	P	41	66 for 7 cm		>100				░	
19.50	19.95	0.45	P	60 for 4 cm			>100				░	
19.50	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

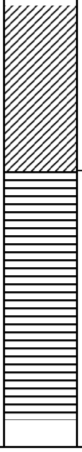
Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 42
Location:	Chainage 157+705	Reduced Level:	27.10
Coordinates:	X - 9°45'20"N Y- 76°32'16"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	22.00 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	22.10.19 To 22.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								▨	
1.50	1.45	0.45	P	6	7	10	17				▨	Very stiff reddish grey sandy silty clay with morrum.
3.00	3.45	0.45	P	7	10	14	24				▨	
4.50	4.95	0.45	P	7	14	20	34				▨	
6.00	6.45	0.45	P	100 for 3 cm			>100	6.00	7.50	91 / 40	≡	6.00m
								7.50	9.00	93 / 21	≡	
								9.00	10.00	95 / 56	≡	
								10.00	11.00	80 / 53	≡	Moderately weathered greyish fine to medium grained strong metamorphic rock.
								11.00	12.00	95 / 52	≡	
								12.00	13.00	90 / 47	≡	
								13.00	14.00	92 / 43	≡	
14.00	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 43
Location:	Chainage 165+310	Reduced Level:	24.00
Coordinates:	X - 9°48'48"N Y- 76°30'14"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	21.30 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	18.10.19 To 20.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D									Very stiff reddish grey clayey silty sand with morrum.
1.50	1.45	0.45	P	8	9	16	25					
3.00	3.45	0.45	P	6	10	21	31					
4.50	4.95	0.45	P	100 for 35 cm			>100	4.50	6.00	54 / 50		4.50m
								6.00	7.50	55 / 53		Moderately to slightly weathered greyish fine to medium grained hard metamorphic rock.
								7.50	8.50	61 / 56		
								8.50	9.50	88 / 71		
9.50	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 44
Location:	Chainage 169+900	Reduced Level:	5.00
Coordinates:	X - 9°50'52"N Y- 76°28'49"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	0.10 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	05.11.19 To 07.11.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								▧	Stiff to very stiff reddiish grey sandy silty clay with gravels.
1.50	1.45	0.45	P	1	2	3	5				▧	
3.00	3.45	0.45	P	2	2	4	6				▧	
4.50	4.95	0.45	P	4	6	8	14				▧	
6.00	6.45	0.45	P	8	9	11	20				▧	
7.50	7.95	0.45	P	8	10	12	22				▧	
10.50	10.95	0.45	P	1	4	8	12				▧	
11.00	11.45	0.45	P	100 for 4 cm			>100	11.00	12.00	38 / Nil	▥	11.00m Completely to highly weathered greyish fine to medium grained very poor and weak metamorphic rock.
								12.00	13.00	28 / Nil	▥	
								13.00	14.00	26 / Nil	▥	
								14.00	15.00	10 / Nil	▥	
								15.00	16.00	18 / Nil	▥	
								16.00	17.00	56 / Nil	▥	
								17.00	18.00	95 / 59	▤	17.00m Moderately to slightly weathered greyish fine to medium grained hard metamorphic rock.
								18.00	19.00	78 / 68	▤	
								19.00	20.50	74 / 70	▤	
								20.50	22.00	95 / 90	▤	
22.00	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 44A
Location:	Chainage 173+090	Reduced Level:	9.40
Coordinates:	X - 9°52'33"N Y- 76°28'23"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	6.60 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	26.10.19 To 05.11.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D									
1.50	1.45	0.45	P	8	100		>100					
3.00	3.45	0.45	P	50			>100					Very dense clayey silty sand morrum mixed with gravels.
4.50	4.95	0.45	P	30	100		>100					
6.00	6.45	0.45	P	100			>100					
7.50	7.95	0.45	P	50			>100	7.50	9.00	63 / 10		7.50m
								9.00	10.00	14 / Nil		
								10.00	11.00	19 / Nil		Completely to highly weathered greyish medium grained very weak soft rock.
								11.00	12.00	29 / Nil		
								12.00	13.50	39 / 07		13.50m
								13.50	15.00	98 / 84		
								15.00	16.50	89 / 82		Moderately to slightly weathered greyish fine to medium grained hard metamorphic rock.
								16.50	17.50	86 / 62		
								17.50	18.54	91 / 56		
18.54	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project: Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No: GT- 44B

Location: Chainage 173+690

Reduced Level: 57.10

Coordinates: X - 9°52'49"N
Y- 76°28'09"E

Method of Boring / Drilling: Rotary

Standing Water Level: 54.00 b.g.l

Dia.of Boring / Drilling: Sx / Nx

Casing Lowered: 3.00 m

Date : From 19.02.20 To 24.02.20

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D									Very dense clayey silty sand morrum mixed with gravels traces of gravels.
1.50	1.45	0.45	P	50			>100					
2.00	2.45	0.45	P	50			>100					
3.50	3.95	0.45	P	50			>100					
5.00	5.45	0.45	P	50			>100					
6.50	6.95	0.45	P	50			>100					
8.00	8.45	0.45	P	50			>100					
12.00	12.45	0.45	P	50			>100					
15.50	15.95	0.45	P	50			>100					
18.00	18.45	0.45	P	100 for 1 cm			>100	18.00	19.00	85 / Nil		18.00m Moderately to slightly weathered greyish fine to medium grained hard metamorphic rock.
								19.00	20.00	89 / 50		
								20.00	21.00	83 / 82		
								21.00	22.00	78 / 84		
								22.00	23.00	82 / 82		
								23.00	24.00	90 / 84		
24.00	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 45
Location:	Chainage 173+980	Reduced Level:	9.60
Coordinates:	X - 9°53'0"N Y- 76°28'11"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	7.60 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	23.10.19 To 25.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								▨	Hard brownish grey clayey silty sand with gravels.
1.50	1.45	0.45	P	18	24	19	43				▨	
												2.00m
								2.00	3.00	96 / 26	▤	Moderately to slightly weathered greyish fine to medium grained strong metamorphic rock.
								3.00	4.50	80 / 50	▤	
								4.50	5.50	93 / 86	▤	
								5.50	6.50	78 / 68	▤	
								6.50	8.50	98 / 66	▤	
8.50	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 46
Location:	Chainage 179+578	Reduced Level:	18.70
Coordinates:	X - 9°54'52"N Y- 76°25'57"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	2.65 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	13.10.19 To 17.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								▨	Hard brownish grey sandy clayey silt with gravels.
												1.10m
1.10	1.55	0.45	P	27	100 for 14 cm		>100	1.10	2.60	46 / 12	☰	
								2.60	4.10	65 / 53	☰	
								4.10	5.60	93 / 83	☰	Highly to slightly weathered greyish fine to medium grained strong metamorphic rock.
								5.60	6.60	71 / 65	☰	
								6.60	7.60	87 / 82	☰	
8.50	(Termination Depth)										☰	

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 47
Location:	Chainage 184+107	Reduced Level:	2.80
Coordinates:	X - 9°56'02"N Y- 76°23'49"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	(-) 2.45 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From 13.10.19 To	13.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								▨	Stiff to very stiff reddiish grey sandy clayey silt with gravels.
1.50	1.45	0.45	P	4	6	7	13					
3.00	3.45	0.45	P	6	7	9	16					
4.50	4.95	0.45	P	6	8	12	20					
6.00	6.45	0.45	P	6	10	12	22					
7.50	7.95	0.45	P	7	11	18	29					
10.00	10.45	0.45	P	100 for 39 cm			>100	10.00	11.00	18 / Nil	▥	10.00m Completely weathered greyish fine to medium grained strong metamorphic rock.
								11.00	12.00	65 / 10		
								12.00	13.00	75 / 11		
								13.00	14.50	73 / Nil		
								14.50	15.50	42 / Nil		
								15.50	16.50	64 / Nil		
								16.50	18.50	43 / Nil		
								18.50	21.50	44 / Nil		
21.50	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 48
Location:	Chainage 188+495	Reduced Level:	8.00
Coordinates:	X - 9°57'37"N Y- 76°22'07"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	6.95 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	19.10.19 To 21.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								░	Medium dense reddish grey silty fine to medium sand with gravels.
1.50	1.45	0.45	P	4	6	7	13					
3.00	3.45	0.45	P	4	8	10	18					4.00m
4.50	4.95	0.45	P	6	9	12	21				▨	
6.00	6.45	0.45	P	6	10	13	23					Very stiff brownish grey sandy silty clay with calcareous nodules.
7.50	7.95	0.45	P	6	10	15	25					
10.50	10.95	0.45	P	8	13	18	31					13.00m
13.50	13.95	0.45	P	100 for 5 cm			>100				▒	
16.50	16.95	0.45	P	100 for 8 cm			>100					Very dense yellowish grey medium sand with gravels traces of rock fragments.
18.50	18.95	0.45	P	100 for 2 cm			>100					
18.50	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 49
Location:	Chainage 190+580	Reduced Level:	6.50
Coordinates:	X - 9°58'32"N Y- 76°21'27"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	6.25 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	14.10.19 To 16.10.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								░	Medium dense reddish grey clayey silty sand with morrum.
1.50	1.45	0.45	P	7	10	15	25				░	
3.00	3.45	0.45	U								▨	3.00m
4.50	4.95	0.45	P	1	1	1	2				▨	Soft grey to dark grey silty clay with decomposed matter.
6.00	6.45	0.45	U								▨	
7.50	7.95	0.45	P	1	1	2	3				▨	8.00m
10.50	10.95	0.45	P	7	9	11	20				░	Medium dense brownish grey silty fine to medium sand.
11.50	11.95	0.45	P	12	13	16	>100	11.70	12.70	25 / Nil	▤	11.50m
								12.70	13.70	66 / 52	▤	
								13.70	14.70	75 / 60	▤	Moderately weathered greyish fine to medium grained strong metamorphic rock.
								14.70	16.20	82 / 51	▤	
								16.20	17.70	80 / 60	▤	
17.70	(Termination Depth)										▤	

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH- GT 01	P	3.00	7	-	74.3	25.70*			1.872		Non-Plastic				SM	DS		23.0	2.65		
	P	6.00	3	0.3	75.1	24.60*			1.875		Non-Plastic				SM	DS		21.0	2.65		
	P	9.00	3	-	77.5	22.50*			1.874		Non-Plastic				SM	DS		21.0	2.65		
	P	12.00	16	-	81.6	18.40*			1.882		Non-Plastic				SM	DS		24.0	2.66		
	P	15.00	27	0.1	84.2	15.70*			1.887		Non-Plastic				SM	DS		28.0	2.66		
	P	21.00	>100	0.5	89.7	9.80*			1.904		Non-Plastic				SM-SP	DS		34.0	2.68		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance ‘N’ value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH- GT 02	P	1.50	10	-	95.3	4.70*			1.875		Non-Plastic				SP	DS		24.0	2.65		
	P	4.50	15	-	95.9	4.10*			1.880		Non-Plastic				SP	DS		25.0	2.65		
	P	7.50	16	-	96.2	3.80*			1.883		Non-Plastic				SP	DS		27.0	2.66		
	P	13.50	26	-	96.8	3.20*			1.887		Non-Plastic				SP	DS		29.0	2.66		
	P	16.50	>100	-	92.7	7.30*			1.908		Non-Plastic				SM-SP	DS		35.0	2.67		
	P	21.50	>100	0.4	93.0	6.60*			1.912		Non-Plastic				SM-SP	DS		36.0	2.68		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm$^{2/}$kg)
BH- GT 04	P	1.50	6	-	75.6	24.40*			1.879		Non-Plastic				SM	DS		22.0	2.65		
	P	4.50	15	-	77.3	22.70*			1.885		Non-Plastic				SM	DS		25.0	2.66		
	P	7.50	27	-	82.4	17.60*			1.890		Non-Plastic				SM	DS		29.0	2.66		
	P	13.50	75	-	85.7	14.30*			1.898		Non-Plastic				SM	DS		34.0	2.67		
	P	18.00	>100	-	88.5	11.50*			1.905		Non-Plastic				SM-SP	DS		36.0	2.68		
	P	20.00	>100	0.2	89.4	10.40*			1.909		Non-Plastic				SM-SP	DS		36.0	2.68		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm$^{2/}$kg)
BH- GT 05	P	3.00	9	1.0	70.5	28.50*			1.885		Non-Plastic				SM	DS		21.0	2.65		
	P	6.00	8	-	68.4	31.60*			1.880		Non-Plastic				SM	DS		20.0	2.65		
	P	9.00	64	-	73.7	26.30*			1.891		Non-Plastic				SM	DS		25.0	2.66		
	P	15.00	>100	-	74.8	25.20*			1.902		Non-Plastic				SM	DS		28.0	2.66		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH- GT 06	P	1.50	4	-	73.1	26.90*			1.877		Non-Plastic				SM	DS		22.0	2.65		
	P	4.50	7	-	75.0	25.00*			1.881		Non-Plastic				SM	DS		24.0	2.65		
	P	7.50	17	-	79.4	20.60*			1.886		Non-Plastic				SM	DS		26.0	2.66		
	P	16.50	84	0.1	84.7	15.20*			1.899		Non-Plastic				SM	DS		35.0	2.67		
	P	21.00	100	0.4	87.8	11.80*			1.902		Non-Plastic				SM-SP	DS		35.0	2.67		
	P	23.50	>100	-	89.2	10.80*			1.906		Non-Plastic				SM-SP	DS		36.0	2.68		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH- GT 07	U	3.00	-	2.3	14.7	60.5	22.5	17.2	1.884	1.608	33.1	16.9	16.2	15.0	CL	UU	0.53	8.0	2.65	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0213 0.0167 0.0114 0.0076 0.0048
	U	6.00	-	2.8	15.2	60.9	21.1	16.3	1.891	1.626	31.4	16.1	15.3	14.0	CL	UU	0.76	10.0	2.66	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0181 0.0152 0.0116 0.0074 0.0044
	P	10.50	27	3.1	17.5	61.4	18.0				29.2	15.0	14.2	12.0	CL						

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm$^{2/}$kg)
BH- GT 08	P	1.50	18	3.4	69.5	27.10*			1.885		Non-Plastic				SM	DS		25.0	2.66		
	P	3.00	25	5.1	72.1	22.80*			1.889		Non-Plastic				SM	DS		27.0	2.66		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH- GT 09	P	3.00	27	-	76.4	23.60*			1.877		Non-Plastic				SM	DS		26.0	2.65		
	P	6.00	27	-	78.6	21.40*			1.881		Non-Plastic				SM	DS		27.0	2.65		
	P	10.50	>100	0.3	88.1	11.60*			1.886		Non-Plastic				SM-SP	DS		34.0	2.66		
	P	15.50	>100	-	90.4	9.60*			1.899		Non-Plastic				SM-SP	DS		35.0	2.67		
	P	20.50	>100	0.6	91.7	7.70*			1.902		Non-Plastic				SM-SP	DS		36.0	2.68		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m$_v$ (cm^2/kg)
BH- GT 10	P	1.50	7	1.9	13.3	61.6	23.2				34.2	17.7	16.5	16.0	CL						
	U	3.00	-	2.5	15.8	61.1	20.6	17.5	1.883	1.603	31.5	16.4	15.1	15.0	CL	UU	0.51	8.0	2.65	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0181 0.0152 0.0116 0.0074 0.0044
	P	6.00	11	2.7	17.7	60.7	18.9				28.4	14.9	13.5	13.0	CL						
	P	10.50	44	0.4	80.9	18.70*			1.896		Non-Plastic				SM	DS		33.0	2.66		
	P	13.50	76	0.8	83.4	15.80*			1.899		Non-Plastic				SM	DS		34.0	2.66		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm$^{2/}$kg)
BH- GT 11	P	1.00	20	-	12.3	62.1	25.6				36.2	18.7	17.5	16.0	CI				2.65		
	U	2.50	-	-	13.5	62.4	24.1	17.7	1.911	1.624	35.1	18.0	17.1	16.0	CI	UU	0.83	10.0	2.66	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0151 0.0126 0.0089 0.0058 0.0036
	P	4.50	46	-	14.7	62.7	22.6				33.4	17.4	16.0	15.0	CL				2.66		
	P	7.50	69	-	15.5	63.2	21.3				32.5	16.9	15.6	14.0	CL				2.66		
	P	10.50	47	-	16.9	63.6	19.5				30.6	15.8	14.8	14.0	CL				2.66		
	P	13.50	33	-	17.8	64.3	17.9				28.2	14.7	13.5	13.0	CL				2.65		
	P	19.50	29	-	19.3	65.2	15.5				25.7	13.3	12.4	13.0	CL				2.65		
	P	25.50	37	-	20.5	65.5	14.0				23.9	12.4	11.5	12.0	CL				2.65		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^{2}/kg)
BH- GT 12	P	1.50	2	-	74.7	25.30*			1.866		Non-Plastic				SM	DS		21.0	2.60		
	P	4.50	3	-	7.6	60.2	32.2				41.9	21.6	20.3	18.0	CI				2.60		
	P	7.50	0	-	8.1	60.5	31.4				40.3	20.8	19.5	17.0	CI				2.61		
	P	13.50	18	-	85.2	14.80*			1.882		Non-Plastic				SM	DS		25.0	2.65		
	P	19.50	16	-	86.7	13.30*			1.887		Non-Plastic				SM	DS		26.0	2.65		
	P	25.50	75	27.3	65.3	7.40*			1.927		Non-Plastic				SP	DS		34.0	2.66		
	P	31.50	>100	30.1	63.8	6.10*			1.931		Non-Plastic				SP	DS		36.0	2.68		
	P	37.50	100	32.4	61.7	5.90*			1.935		Non-Plastic				SP	DS		35.0	2.68		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH- GT 13	P	2.00	3	-	21.3	63.2	15.5				26.1	13.8	12.3	14.0	CL				2.62		
	U	5.00	-	-	23.5	63.6	12.9	23.4	1.847	1.497	22.3	11.7	10.6	14.0	CL	UU	0.28	11.0	2.63	0.25-0.5	0.0239
																				0.5-1.0	0.0204
																				1.0-2.0	0.0152
																				2.0-4.0	0.0111
																				4.0-8.0	0.0074
	P	8.00	3	-	25.1	64.0	10.9				19.4	10.1	9.3	13.0	CL-ML				2.63		
	P	14.00	23	24.8	64.7	10.50*			1.924		Non-Plastic				SM-SP	DS		34.0	2.67		
	P	20.00	>100	28.5	63.3	8.20*			1.927		Non-Plastic				SM-SP	DS		35.0	2.68		
	P	26.00	>100	30.6	62.8	6.60*			1.931		Non-Plastic				SM-SP	DS		36.0	2.68		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm$^{2/}$kg)
BH- GT 14	P	1.50	10	1.5	14.1	60.4	24.0				36.0	18.7	17.3	17.0	CI				2.63		
	P	4.50	40	2.1	17.2	60.2	20.5				34.1	17.6	16.5	16.0	CL				2.63		
	P	7.50	18	3.0	18.5	59.8	18.7				31.6	16.4	15.2	15.0	CL				2.63		
	P	10.50	>100	-	91.6	8.40*			1.897		Non-Plastic				SM	DS		34.0	2.66		
	P	16.50	>100	-	93.3	6.70*			1.900		Non-Plastic				SM	DS		35.0	2.66		
	P	19.50	43	-	20.4	56.0	23.6				35.2	18.0	17.2	16.0	CI				2.65		
	P	21.50	>100	8.2	87.2	4.60*			1.927		Non-Plastic				SP	DS		36.0	2.68		
	P	27.00	>100	9.0	87.0	4.00*			1.931		Non-Plastic				SP	DS		36.0	2.68		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH- GT 15	P	1.50	9	-	9.6	61.4	29.0				38.7	19.8	18.9	18.0	CI				2.62		
	U	4.50	-	-	11.2	61.7	27.1	18.6	1.884	1.589	36.6	19.1	17.5	17.0	CI	UU	0.58	7.0	2.64	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0192 0.0157 0.0122 0.0080 0.0050
	P	7.50	18	-	81.9	18.10*			1.885		Non-Plastic				SM	DS		26.0	2.65		
	P	13.50	22	-	18.6	64.7	16.7				26.5	13.8	12.7	13.0	CL				2.64		
	P	19.50	19	-	21.3	65.3	13.4				24.1	12.5	11.6	12.0	CL				2.64		
	P	22.50	>100	28.5	66.9	4.60*			1.928		Non-Plastic				SP	DS		35.0	2.68		
	P	27.50	>100	31.8	64.0	4.20*			1.932		Non-Plastic				SP	DS		36.0	2.68		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm$^{2/}$kg)
BH- GT 16	P	1.50	5	-	8.7	61.1	30.2				40.5	21.1	19.4	18.0	CI				2.62		
	U	4.50	-	-	9.8	61.8	28.4	19.7	1.871	1.563	38.2	19.7	18.5	18.0	CI	UU	0.45	6.0	2.63	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0203 0.0174 0.0121 0.0080 0.0048
	P	7.50	18	-	12.5	62.4	25.1				35.6	18.2	17.4	16.0	CI				2.64		
	P	13.50	65	-	83.4	16.60*			1.894		Non-Plastic				SM	DS		35.0	2.66		
	P	18.00	100	-	85.6	14.40*			1.899		Non-Plastic				SM	DS		35.0	2.66		
	P	24.00	81	-	86.7	13.30*			1.902		Non-Plastic				SM	DS		35.0	2.66		
	P	30.00	56	-	18.2	66.1	15.7				26.3	13.7	12.6	14.0	CL				2.67		
	P	36.00	>100	29.5	64.6	5.90*			1.930		Non-Plastic				SM-SP	DS		36.0	2.68		
	P	41.00	91	30.4	63.3	6.30*			1.935		Non-Plastic				SM-SP	DS		36.0	2.68		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH- GT 17	P	1.50	3	0.6	11.7	61.8	25.9				36.5	18.7	17.8	17.0	CI				2.62		
	U	4.00	-	1.0	12.2	62.1	24.7	21.3	1.853	1.528	35.1	17.5	17.6	16.0	CI	UU	0.39	7.0	2.62	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0225 0.0184 0.0132 0.0091 0.0059
	P	6.00	2	-	15.3	62.7	22.0				32.4	16.9	15.5	15.0	CL				2.62		
	P	10.50	36	-	82.4	17.60*			1.884		Non-Plastic				SM	DS		31.0	2.65		
	P	16.50	25	-	83.1	16.90*			1.880		Non-Plastic				SM	DS		30.0	2.66		
	P	22.50	32	-	83.9	16.10*			1.881		Non-Plastic				SM	DS		30.0	2.66		
	P	28.50	39	-	85.2	14.80*			1.889		Non-Plastic				SM	DS		32.0	2.66		
	P	34.50	65	25.4	67.8	6.80*			1.917		Non-Plastic				SM-SP	DS		34.0	2.67		
	P	40.50	100	32.5	64.2	3.30*			1.921		Non-Plastic				SP	DS		35.0	2.68		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm$^{2/}$kg)
BH- GT 18	U	2.00	-	-	10.7	61.7	27.6	21.3	1.853	1.528	37.1	18.7	18.4	17.0	CI	UU	0.61	8.0	2.65	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0211 0.0183 0.0128 0.0080 0.0052
	P	4.50	40	0.4	13.8	62.5	23.3				33.5	17.2	16.3	14.0	CL				2.65		
	P	7.50	38	0.7	14.4	63.1	21.8				32.4	16.8	15.6	13.0	CL				2.66		
	P	13.50	66	-	83.3	16.70*			1.888		Non-Plastic				SM	DS		33.0	2.66		
	P	19.50	63	0.2	84.2	15.60*			1.891		Non-Plastic				SM	DS		33.0	2.66		
	P	25.50	87	-	86.1	13.90*			1.895		Non-Plastic				SM	DS		34.0	2.67		
	P	31.50	71	-	87.6	12.40*			1.899		Non-Plastic				SM	DS		34.0	2.67		
	P	34.50	>100	29.4	65.7	4.90*			1.919		Non-Plastic				SM-SP	DS		35.0	2.68		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH- GT 19	P	3.00	3	-	12.1	62.0	25.9				36.0	18.6	17.4	16.0	CI				2.61		
	P	6.00	2	-	13.7	62.6	23.7				33.7	17.3	16.4	15.0	CL				2.62		
	U	8.00	-	-	15.3	63.8	20.9	23.2	1.823	1.480	31.2	15.9	15.3	13.0	CL	UU	0.25	8.0	2.62	0.25-0.5	0.0254
																				0.5-1.0	0.0209
																				1.0-2.0	0.0153
																				2.0-4.0	0.0107
																				4.0-8.0	0.0069
	P	11.50	>100	25.7	65.2	9.10*			1.922		Non-Plastic				SM-SP	DS		35.0	2.66		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH- GT 20	P	3.00	12	5.1	12.3	62.2	20.4				31.6	16.2	15.4	14.0	CL				2.63		
	P	6.00	13	6.3	14.0	62.7	17.0				29.2	15.0	14.2	13.0	CL				2.63		
	P	10.50	>100	-	18.6	61.5	19.9				33.1	16.8	16.3	14.0	CL				2.67		
	P	16.50	75	-	20.7	60.0	19.3				32.0	16.5	15.5	13.0	CL				2.66		
	P	22.50	53	-	21.3	60.5	18.2				30.5	16.1	14.4	12.0	CL				2.66		
	P	28.50	>100	2.0	93.2	4.80*			1.929		Non-Plastic				SP	DS		36.0	2.68		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm$^{2/}$kg)
BH- GT 21	P	1.50	1	-	8.5	62.7	28.8				38.3	19.9	18.4	19.0	CI				2.61		
	P	4.50	3	0.6	9.4	63.4	26.6				36.4	18.8	17.6	17.0	CI				2.62		
	P	9.00	21	1.1	11.2	64.1	23.6				33.2	16.9	16.3	15.0	CL				2.64		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH- GT 22	U	4.00	-	-	11.3	62.2	26.5	19.8	1.872	1.563	36.2	18.8	17.4	18.0	CI	UU	0.66	8.0	2.65	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0205 0.0163 0.0116 0.0074 0.0047
	P	6.00	17	0.4	14.0	63.1	22.5				32.4	16.9	15.5	14.0	CL				2.65		
	P	10.50	73	-	84.9	15.10*			1.886		Non-Plastic				SM	DS		34.0	2.66		
	P	16.50	70	0.5	85.5	14.00*			1.890		Non-Plastic				SM	DS		34.0	2.66		
	P	22.50	44	-	86.3	13.70*			1.893		Non-Plastic				SM	DS		32.0	2.66		
	P	28.50	55	0.1	87.0	12.90*			1.895		Non-Plastic				SM	DS		33.0	2.67		
	P	34.50	>100	27.4	61.6	11.00*			1.917		Non-Plastic				SM-SP	DS		35.0	2.67		
	P	40.50	100	28.7	62.8	8.50*			1.921		Non-Plastic				SM-SP	DS		36.0	2.68		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm$^{2/}$kg)
BH- GT 23	P	3.00	18	-	10.9	62.3	26.8				36.9	18.8	18.1	19.0	CI				2.62		
	U	6.00	-	-	11.5	62.9	25.6	19.0	1.876	1.576	35.3	18.0	17.3	15.0	CI	UU	0.50	8.0	2.63	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0214 0.0167 0.0115 0.0079 0.0050
	P	10.50	7	-	13.6	63.6	22.8				32.4	16.8	15.6	13.0	CL				2.63		
	P	16.50	38	-	14.8	64.1	21.1				30.6	16.0	14.6	12.0	CL				2.64		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm$^{2/}$kg)
BH- GT 24	U	2.00	-	-	11.7	62.7	25.6	15.4	1.919	1.663	35.3	18.0	17.3	16.0	CI	UU	0.91	10.0	2.66	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0145 0.0121 0.0082 0.0055 0.0033
	P	4.50	31	-	12.5	63.2	24.3				34.0	17.6	16.4	16.0	CL				2.66		
	P	7.50	14	-	13.9	63.1	23.0				32.5	16.8	15.7	14.0	CL				2.65		
	P	13.50	32	-	15.4	63.7	20.9				30.7	15.7	15.0	14.0	CL				2.65		
	P	19.50	65	23.4	66.3	10.30*			1.922		Non-Plastic				SM-SP	DS		33.0	2.66		
	P	25.50	>100	28.9	62.5	8.60*			1.925		Non-Plastic				SM-SP	DS		35.0	2.68		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm$^{2/}$kg)
BH- GT 25	P	3.00	36	-	13.3	62.4	24.3				33.9	17.5	16.4	16.0	CL				2.66		
	U	5.00	-	-	14.6	62.9	22.5	18.6	1.903	1.605	32.6	16.9	15.7	15.0	CI	UU	0.72	10.0	2.66	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0200 0.0151 0.0105 0.0069 0.0042
	P	7.50	33	-	15.2	63.3	21.5				31.4	16.0	15.4	14.0	CL				2.66		
	P	13.50	24	-	16.1	63.9	20.0				29.5	15.1	14.4	13.0	CL				2.66		
	P	19.50	38	-	18.5	64.5	17.0				26.7	13.9	12.8	12.0	CL				2.66		
	P	22.50	80	29.3	65.2	5.50*			1.919		Non-Plastic				SP	DS		34.0	2.67		
	P	31.50	100	32.0	63.1	4.90*			1.924		Non-Plastic				SP	DS		35.0	2.68		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH- GT 26	U	2.00	-	-	14.6	62.8	22.6	15.4	1.879	1.628	32.2	16.6	15.6	14.0	CI	UU	0.42	8.0	2.65	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0213 0.0178 0.0126 0.0085 0.0054
	P	4.50	4	-	15.7	63.7	20.6				30.1	15.6	14.5	12.0	CL				2.65		
	P	7.50	22	-	16.9	64.4	18.7				28.3	14.7	13.6	12.0	CL				2.66		
	P	13.50	100	27.6	65.2	7.20*			1.920		Non-Plastic				SM-SP	DS		35.0	2.68		
	P	18.50	>100	30.1	63.7	6.20*			1.923		Non-Plastic				SM-SP	DS		36.0	2.68		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH- GT 27	P	3.00	8	0.5	12.7	61.6	25.2				35.3	18.0	17.3	15.0	CI				2.62		
	P	6.00	3	0.9	13.5	62.1	23.5				33.6	17.1	16.5	14.0	CL				2.62		
	U	10.50	-	1.2	14.8	62.9	21.1	20.4	1.862	1.547	30.8	15.8	15.0	14.0	CL	UU	0.38	8.0	2.63	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0219 0.0186 0.0132 0.0088 0.0059
	P	13.50	73	28.8	63.7	7.50*			1.927		Non-Plastic				SM	DS		35.0	2.68		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm$^{2/}$kg)
BH- GT 28	P	1.50	3	-	71.8	28.20*			1.891		Non-Plastic				SM	DS		24.0	2.64		
	P	4.50	9	-	72.5	27.50*			1.896		Non-Plastic				SM	DS		26.0	2.66		
	P	7.50	>100	29.4	63.7	6.90*			1.918		Non-Plastic				SM-SP	DS		35.0	2.68		
	P	13.50	>100	31.3	64.2	4.50*			1.922		Non-Plastic				SP	DS		36.0	2.68		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm$^{2/}$kg)
BH- GT 29	P	1.50	5	5.0	12.1	62.4	20.5				36.5	18.6	17.9	16.0	CI				2.64		
	P	4.50	58	1.7	84.2	14.10*			1.910		Non-Plastic				SM	DS		33.0	2.65		
	P	7.50	43	1.0	85.9	13.10*			1.907		Non-Plastic				SM	DS		33.0	2.66		
	P	13.50	41	-	87.7	12.30*			1.900		Non-Plastic				SM	DS		33.0	2.66		
	P	19.50	43	3.2	87.3	9.50*			1.902		Non-Plastic				SM-SP	DS		34.0	2.66		
	P	25.50	>100	10.6	85.4	4.00*			1.926		Non-Plastic				SP	DS		36.0	2.68		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm$^{2/}$kg)
BH- GT 30	P	1.50	12	4.5	27.6	45.3	22.6				30.2	16.3	13.9	14.0	CL				2.65		
	P	3.00	15	3.0	30.1	48.1	18.8				28.4	15.1	13.3	14.0	CL				2.65		
	P	4.50	17	2.2	28.4	50.2	19.2				29.0	15.5	13.5	14.0	CL				2.65		
	P	6.00	22	-	36.5	47.5	16.0				26.5	14.2	12.3	13.0	CL				2.66		
	P	7.50	22	2.0	27.7	51.6	18.7				27.6	14.0	13.6	13.0	CL				2.66		
	P	10.50	12	3.8	35.5	45.2	15.5				25.7	13.7	12.0	13.0	CL				2.66		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH- GT 31	P	1.50	15	3.6	12.3	55.3	28.8				39.6	20.2	19.4	18.0	CI				2.64		
	P	3.00	19	5.1	11.8	56.2	26.9				38.4	19.6	18.8	17.0	CI				2.64		
	P	4.50	4	4.2	15.1	54.7	26.0				37.2	19.0	18.2	16.0	CI				2.62		
	P	6.00	6	6.3	12.5	55.8	25.4				36.3	18.7	17.6	16.0	CI				2.62		
	P	7.50	7	5.7	16.7	53.3	24.3				35.1	18.0	17.1	15.0	CI				2.62		
	P	10.50	8	4.9	14.9	54.1	26.1				35.8	18.4	17.4	15.0	CI				2.63		
	P	13.50	12	6.7	17.6	56.6	19.1				33.2	17.0	16.2	14.0	CL				2.63		
	P	16.50	39	8.6	87.4	4.00*			1.885		Non-Plastic				SP	DS		34.0	2.65		
	P	19.50	>100	11.7	85.1	3.20*			1.912		Non-Plastic				SP	DS		35.0	2.66		
	P	22.50	>100	13.5	81.7	4.80*			1.918		Non-Plastic				SP	DS		36.0	2.66		
	P	24.50	>100	14.1	82.3	3.60*			1.923		Non-Plastic				SP	DS		36.0	2.68		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm$^{2/}$kg)
BH- GT 32	P	1.50	15	5.3	79.2	15.50*			1.886		Non-Plastic				SM	DS		29.0	2.66		
	P	3.00	23	6.8	80.1	13.10*			1.892		Non-Plastic				SM	DS		31.0	2.66		
	P	4.50	5	1.5	16.3	57.2	25.0				36.2	18.9	17.3	15.0	CI				2.63		
	P	6.00	12	2.6	18.2	56.1	23.1				35.6	18.5	17.1	15.0	CI				2.64		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH- GT 33	P	1.50	12	8.4	26.7	40.2	24.7				37.5	19.2	18.3	18.0	CI				2.64		
	P	3.00	25	-	29.4	44.1	26.5				39.1	19.7	19.4	18.0	CI				2.66		
	P	4.50	28	3.5	28.0	43.3	25.2				38.3	19.4	18.9	17.0	CI				2.66		
	P	6.00	14	-	31.1	45.0	23.9				36.7	19.0	17.7	17.0	CI				2.65		
	P	7.50	16	5.1	26.3	46.1	22.5				36.2	18.7	17.5	16.0	CI				2.66		
	P	10.50	22	6.0	23.7	47.0	23.3				35.0	18.0	17.0	15.0	CI				2.66		
	P	13.50	29	6.5	24.8	48.2	20.5				33.3	17.1	16.2	14.0	CL				2.66		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m$_v$ (cm$^{2/}$kg)
BH- GT 34	P	1.50	15	3.3	79.2	17.50*			1.888		Non-Plastic				SP	DS		30.0	2.66		
	P	3.00	17	4.1	79.2	16.70*			1.893		Non-Plastic				SP	DS		30.0	2.66		
	P	4.50	16	3.8	80.1	16.10*			1.895		Non-Plastic				SP	DS		31.0	2.66		
	P	7.50	11	2.4	13.6	55.4	28.6				37.4	19.1	18.3	16.0	CI				2.64		
	P	10.50	9	3.5	14.7	54.2	27.6				36.7	18.8	17.9	16.0	CI				2.64		
	P	13.50	20	4.6	16.2	53.0	26.2				35.5	18.2	17.3	15.0	CI				2.65		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH- GT 35	P	1.50	21	4.4	13.9	52.1	29.6				41.4	20.2	21.2	19.0	CI				2.64		
	P	3.00	31	3.0	15.0	53.2	28.8				38.4	19.6	18.8	18.0	CI				2.65		
	P	4.50	35	2.1	14.4	52.5	31.0				37.2	19.0	18.2	17.0	CI				2.65		
	P	6.00	30	6.3	13.7	51.9	28.1				36.3	18.7	17.6	17.0	CI				2.65		
	P	7.50	34	5.0	16.6	50.8	27.6				35.1	18.0	17.1	16.0	CI				2.66		
	P	10.50	29	7.2	18.1	47.9	26.8				35.8	18.4	17.4	16.0	CI				2.66		
	P	13.50	>100	7.7	88.3	4.00*			1.907		Non-Plastic				SP	DS		35.0	2.66		
	P	16.50	>100	9.6	87.2	3.20*			1.914		Non-Plastic				SP	DS		35.0	2.66		
	P	18.50	>100	11.8	85.7	2.50*			1.920		Non-Plastic				SP	DS		36.0	2.66		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m$_v$ (cm^2/kg)
BH- GT 37	P	1.50	10	1.9	86.2	11.90*			1.881		Non-Plastic				SM-SP	DS		29.0	2.65		
	P	3.00	10	2.5	87.1	10.40*			1.885		Non-Plastic				SM-SP	DS		30.0	2.65		
	U	6.00	-	-	5.2	60.2	34.6	24.1	1.814	1.462	45.1	23.8	21.3	21.0	CI	UU	0.26	3.0	2.62	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0385 0.0324 0.0247 0.0186 0.0123
	U	9.00	-	-	6.0	60.3	33.7	23.6	1.819	1.472	43.5	23.3	20.2	21.0	CI	UU	0.28	3.0	2.62	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0365 0.0303 0.0236 0.0172 0.0119
	P	10.50	8	-	5.7	60.0	34.3				44.0	22.6	21.4	20.0	CI				2.63		
	P	13.50	11	8.6	30.9	45.4	15.1				24.1	14.5	9.6	13.0	CL				2.65		
	P	15.00	13	10.5	31.5	46.0	12.0				21.7	14.0	7.7	12.0	CL-ML				2.65		
	P	16.50	15	12.7	34.4	41.8	11.1				21.0	13.7	7.3	12.0	CL-ML				2.65		
	P	18.00	21	13.1	36.1	40.2	10.6				20.3	13.3	7.0	11.0	CL-ML				2.65		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH- GT 38	P	1.50	4	11.6	28.4	40.2	19.8				30.4	16.1	14.3	16.0	CL				2.63		
	P	3.00	6	13.5	26.3	41.7	18.5				28.6	15.0	13.6	14.0	CL				2.63		
	P	4.50	20	-	92.6	7.40*			1.888		Non-Plastic				SM-SP	DS		30.0	2.64		
	P	6.00	24	-	94.7	5.30*			1.893		Non-Plastic				SM-SP	DS		31.0	2.65		
	P	7.50	26	-	97.0	3.00*			1.897		Non-Plastic				SP	DS		31.0	2.65		
	P	10.50	31	-	96.5	3.50*			1.900		Non-Plastic				SP	DS		32.0	2.65		
	P	13.50	19	-	95.4	4.60*			1.894		Non-Plastic				SP	DS		30.0	2.66		
	P	16.50	24	-	93.1	6.90*			1.902		Non-Plastic				SM-SP	DS		32.0	2.66		
	P	22.00	>100	11.6	78.1	10.30*			1.911		Non-Plastic				SM-SP	DS		35.0	2.66		
	P	25.00	>100	13.5	79.3	7.20*			1.917		Non-Plastic				SM-SP	DS		35.0	2.66		
	P	27.00	>100	14.8	80.2	5.00*			1.921		Non-Plastic				SM-SP	DS		36.0	2.66		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm$^{2/}$kg)
BH- GT 39	P	1.50	>100	-	83.6	16.40*			1.888		Non-Plastic				SM	DS		35.0	2.63		
	P	3.00	>100	-	85.7	14.30*			1.888		Non-Plastic				SM	DS		35.0	2.63		
	P	4.50	>100	-	86.4	13.60*			1.888		Non-Plastic				SM	DS		35.0	2.64		
	P	6.00	30	-	85.0	15.00*			1.893		Non-Plastic				SM	DS		34.0	2.65		
	P	7.50	42	-	82.7	17.30*			1.897		Non-Plastic				SM	DS		34.0	2.65		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm$^{2/}$kg)
BH- GT 40	P	1.50	16	15.4	21.6	51.5	11.5				24.6	13.2	11.4	12.0	CL				2.64		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH- GT 36B	P	1.50	22	12.5	25.3	41.4	20.8				31.4	16.3	15.1	14.0	CL				2.64		
	P	4.50	>100	3.1	82.6	14.30*			1.917		Non-Plastic				SM	DS		36.0	2.66		
	P	6.00	>100	2.6	84.5	12.90*			1.923		Non-Plastic				SM	DS		36.0	2.66		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm$^{2/}$kg)
BH- GT 44A	P	1.50	>100	4.6	84.7	10.70*			1.921		Non-Plastic				SM-SP	DS		35.0	2.65		
	P	4.50	>100	5.2	85.3	9.50*			1.925		Non-Plastic				SM-SP	DS		36.0	2.66		
	P	6.00	>100	6.0	86.8	7.20*			1.930		Non-Plastic				SM-SP	DS		37.0	2.67		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm$^{2/}$kg)
BH- GT 44B	P	2.00	>100	4.0	81.4	14.60*			1.924		Non-Plastic				SM	DS		35.0	2.66		
	P	5.00	>100	5.5	83.3	11.20*			1.931		Non-Plastic				SM-SP	DS		36.0	2.66		
	P	8.00	>100	6.1	84.5	9.40*			1.938		Non-Plastic				SM-SP	DS		36.0	2.67		
	P	15.50	>100	7.6	87.0	5.40*			1.942		Non-Plastic				SM-SP	DS		37.0	2.67		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH- GT 86A	P	1.50	4	1.0	72.6	26.40*			1.870		Non-Plastic				SM	DS		26.0	2.64		
	P	4.50	9	2.1	74.2	23.70*			1.879		Non-Plastic				SM	DS		28.0	2.64		
	P	7.50	>100	6.9	21.7	50.6	20.8				29.5	15.3	14.2	18.0	CL				2.66		
	P	13.50	>100	9.2	24.5	47.8	18.5				28.1	14.7	13.4	14.0	CL				2.66		
	P	19.50	>100	11.5	26.8	44.5	17.2				26.4	13.8	12.6	12.0	CL				2.66		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH- GT 87A	P	3.00	10	2.0	87.3	10.70*			1.921		Non-Plastic				SM-SP	DS		28.0	2.65		
	P	6.00	15	2.7	85.4	11.90*			1.925		Non-Plastic				SM-SP	DS		29.0	2.65		
	P	10.50	35	5.4	16.8	50.2	27.6				38.4	19.9	18.5	17.0	CI				2.66		
	P	19.50	>100	10.6	21.7	53.7	14.0				24.6	13.0	11.6	13.0	CL				2.67		
	P	25.50	>100	13.0	24.5	51.6	10.9				21.8	11.6	10.2	10.0	CL				2.67		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH- GT 41	P	1.50	36	8.4	21.7	53.2	16.7				27.4	14.5	12.9	13.0	CL				2.66		
	P	4.50	37	12.5	24.6	50.6	12.3				23.5	12.7	10.8	12.0	CL				2.66		
	P	7.50	44	16.1	26.5	46.8	10.6				21.1	11.1	10.0	10.0	CL				2.67		
	P	13.50	100	2.9	78.4	18.70*			1.920		Non-Plastic				SM	DS		36.0	2.68		
	P	19.50	>100	3.5	81.3	15.20*			1.927		Non-Plastic				SM	DS		37.0	2.68		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm$^{2/}$kg)
BH- GT 42	P	1.50	17	3.3	24.1	54.6	18.0				29.2	15.4	13.8	13.0	CL				2.64		
	P	3.00	24	4.0	21.2	52.1	22.7				32.5	16.8	15.7	14.0	CL				2.64		
	P	4.50	34	4.7	18.5	51.7	25.1				34.1	17.9	16.2	14.0	CL				2.65		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm$^{2/}$kg)
BH- GT 43	P	1.50	25	4.8	29.4	52.6	13.2				22.3	12.0	10.3	11.0	CL				2.64		
	P	3.00	31	5.5	31.4	51.8	11.3				19.7	11.0	8.7	10.0	CL				2.64		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm$^{2/}$kg)
BH- GT 44	P	3.00	6	1.8	20.6	51.6	26.0				38.2	19.9	18.3	16.0	CI				2.64		
	P	6.00	20	2.5	21.9	50.5	25.1				36.5	19.1	17.4	16.0	CI				2.65		
	P	10.50	12	3.6	23.2	49.0	24.2				35.6	18.5	17.1	15.0	CI				2.65		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm$^{2/}$kg)
BH- GT 45	P	1.50	43	6.3	32.7	50.2	10.8				17.8	10.3	7.5	10.0	CL-ML				2.65		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH- GT 47	P	1.50	13	2.6	19.3	54.0	24.1				32.3	16.8	15.5	16.0	CL				2.64		
	P	3.00	16	2.1	15.6	58.7	23.6				31.7	16.5	15.2	15.0	CL				2.64		
	P	4.50	20	1.9	18.4	59.4	20.3				29.6	15.6	14.0	14.0	CL				2.65		
	P	6.00	22	3.4	21.4	56.0	19.2				28.1	14.7	13.4	12.0	CL				2.65		
	P	7.50	29	3.0	22.5	56.6	17.9				27.2	14.3	12.9	12.0	CL				2.66		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m$_v$ (cm$^{2/}$kg)
BH- GT 48	P	1.50	13	5.8	81.3	12.90*			1.881		Non-Plastic				SM	DS		28.0	2.64		
	P	4.50	21	1.6	14.3	57.0	27.1				39.1	20.0	19.1	18.0	CI				2.64		
	P	7.50	25	2.3	17.1	54.2	26.4				37.6	19.3	18.3	17.0	CI				2.65		
	P	13.50	>100	11.7	84.3	4.00*			1.927		Non-Plastic				SP	DS		36.0	2.68		
	P	18.50	>100	12.6	85.0	2.40*			1.931		Non-Plastic				SP	DS		36.0	2.68		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m$_v$ (cm$^{2/}$kg)
BH- GT 49	P	1.50	25	10.3	71.6	18.10*			1.885		Non-Plastic				SM	DS		30.0	2.66		
	U	3.00	-	-	6.2	56.3	37.5	23.6	1.751	1.417	49.1	25.0	24.1	20.0	CI	UU	0.27	4.0	2.62	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0403 0.0311 0.0212 0.0147 0.0102
	U	6.00	-	-	7.6	57.2	35.2	22.4	1.758	1.436	47.4	24.6	22.8	18.0	CI	UU	0.30	4.0	2.62	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0356 0.0283 0.0204 0.0147 0.0099
	P	10.50	20	-	86.3	13.70*			1.902		Non-Plastic				SM-SP	DS		30.0	2.66		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST RESULTS OF ROCK SAMPLES

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No.	**Depth** (m)	**Unit Weight** (gm/cc)	**Water Absorption** (%)	**Crushing Strength** *(kg/cm^2)*	**Specific Gravity** (%)	**Point Load** *(kg/cm^2)*
GT 05	21.00	2.18	4.10	42.5	2.66	1.7
GT 07	13.00	2.58	1.32	112.0	2.68	4.6
GT 07	14.50	2.71	1.21	185.0	2.70	7.7
GT 07	16.00	2.74	1.13	201.0	2.71	8.4
GT 07	17.00	2.68	1.50	149.0	2.69	6.2
GT 07	18.00	2.70	1.42	164.0	2.70	6.8
GT 08	7.50	2.69	1.55	193.0	2.70	8.0
GT 08	8.50	2.72	1.47	219.0	2.71	9.1
GT 08	9.50	2.67	1.80	151.0	2.68	6.3
GT 08	10.50	2.68	1.63	170.0	2.68	7.0
GT 08	12.50	2.60	2.23	128.0	2.67	5.3

LABORATORY TEST RESULTS OF ROCK SAMPLES

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No.	**Depth** (m)	**Unit Weight** (gm/cc)	**Water Absorption** (%)	**Crushing Strength** *(kg/cm^2)*	**Specific Gravity** (%)	**Point Load** *(kg/cm^2)*
GT- 11	33.30	2.69	1.13	171.0	2.70	7.1
GT- 11	34.30	2.71	0.95	193.0	2.72	8.0
GT- 11	35.30	2.74	0.81	227.0	2.72	9.4
GT- 11	36.30	2.72	0.89	215.0	2.71	8.9
GT- 11	37.30	2.71	1.02	188.0	2.71	7.8
GT- 19	12.10	2.68	1.78	167.0	2.69	7.0
GT- 19	13.10	2.68	1.86	164.0	2.69	6.8
GT- 19	14.10	2.66	1.72	152.0	2.69	6.3
GT- 19	15.10	2.66	1.65	155.0	2.69	6.5
GT- 19	16.10	2.68	1.80	170.0	2.70	7.0
GT- 20	31.75	2.66	2.13	114.0	2.69	4.7
GT- 20	32.75	2.65	2.21	99.0	2.69	4.1
GT- 20	33.75	2.64	2.44	85.0	2.68	3.5
GT- 20	34.75	2.63	2.65	68.0	2.68	2.8

LABORATORY TEST RESULTS OF ROCK SAMPLES

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No.	**Depth** (m)	**Unit Weight** (gm/cc)	**Water Absorption** (%)	**Crushing Strength** *(kg/cm^2)*	**Specific Gravity** (%)	**Point Load** *(kg/cm^2)*
GT- 21	12.40	2.72	1.09	208.0	2.71	8.6
GT- 21	13.40	2.70	0.99	195.0	2.72	8.1
GT- 21	14.40	2.69	1.05	184.0	2.70	7.6
GT- 21	15.40	2.68	1.14	171.0	2.70	7.1
GT- 21	16.40	2.67	1.20	153.0	2.69	6.3
GT- 23	19.00	2.68	1.17	176.0	2.69	7.3
GT- 23	20.00	2.66	1.23	159.0	2.69	6.6
GT- 23	21.00	2.64	1.31	138.0	2.68	5.7
GT- 23	22.00	2.69	1.06	180.0	2.71	7.5
GT- 23	23.00	2.68	1.11	173.0	2.70	7.2
GT- 23	24.00	2.66	1.16	147.0	2.69	6.1
GT- 23	25.00	2.65	1.28	135.0	2.69	5.6

LABORATORY TEST RESULTS OF ROCK SAMPLES

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No.	**Depth** (m)	**Unit Weight** (gm/cc)	**Water Absorption** (%)	**Crushing Strength** *(kg/cm^2)*	**Specific Gravity** (%)	**Point Load** *(kg/cm^2)*
GT- 23	26.00	2.65	1.20	129.0	2.68	5.3
GT- 27	18.50	2.69	1.06	190.0	2.70	7.9
GT- 27	19.50	2.70	0.98	194.0	2.71	8.0
GT- 27	20.50	2.72	0.81	204.0	2.71	8.5
GT- 27	21.50	2.68	1.09	182.0	2.70	7.6
GT- 27	22.50	2.67	1.17	175.0	2.69	7.3
GT- 30	14.00	2.69	1.17	175.0	2.71	7.2
GT- 30	15.00	2.70	0.98	198.0	2.72	8.2
GT- 30	16.00	2.73	0.71	210.0	2.73	8.7
GT- 30	17.00	2.70	0.77	183.0	2.71	7.6
GT- 30	18.00	2.68	1.23	180.0	2.72	7.5

LABORATORY TEST RESULTS OF ROCK SAMPLES

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No.	**Depth** (m)	**Unit Weight** (gm/cc)	**Water Absorption** (%)	**Crushing Strength** (kg/cm^2)	**Specific Gravity** (%)	**Point Load** (kg/cm^2)
GT- 32	7.50	2.70	1.06	201.0	2.72	8.4
GT- 32	8.50	2.72	0.83	227.0	2.73	9.5
GT- 32	9.50	2.71	0.99	195.0	2.72	8.1
GT- 32	11.00	2.69	0.94	188.0	2.71	7.8
GT- 32	12.00	2.70	1.02	205.0	2.72	8.5
GT- 33	14.00	2.69	1.04	167.0	2.70	6.9
GT- 33	15.00	2.70	0.93	198.0	2.70	8.2
GT- 33	16.00	2.69	0.85	186.0	2.71	7.7
GT- 33	17.00	2.71	0.64	221.0	2.72	9.2
GT- 33	18.00	2.72	0.72	233.0	2.72	9.7

LABORATORY TEST RESULTS OF ROCK SAMPLES

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No.	**Depth** (m)	**Unit Weight** (gm/cc)	**Water Absorption** (%)	**Crushing Strength** *(kg/cm^2)*	**Specific Gravity** (%)	**Point Load** *(kg/cm^2)*
GT- 34	16.50	2.68	1.23	162.0	2.70	6.7
GT- 34	17.50	2.68	1.17	159.0	2.70	6.6
GT- 34	18.50	2.68	1.20	153.0	2.70	6.3
GT- 34	19.50	2.70	0.91	186.0	2.71	7.7
GT- 34	20.50	2.70	0.87	192.0	2.71	8.0
GT- 36	0.00	2.67	1.30	151.0	2.69	6.3
GT- 36	1.00	2.71	1.07	184.0	2.71	7.6
GT- 36	2.00	2.68	1.22	166.0	2.70	6.9
GT- 36	3.50	2.69	1.17	178.0	2.70	7.4
GT- 37	20.00	2.67	1.15	195.0	2.72	8.1

LABORATORY TEST RESULTS OF ROCK SAMPLES

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No.	**Depth** (m)	**Unit Weight** (gm/cc)	**Water Absorption** (%)	**Crushing Strength** *(kg/cm^2)*	**Specific Gravity** (%)	**Point Load** *(kg/cm^2)*
GT- 37	21.00	2.69	1.07	201.0	2.70	8.3
GT- 37	22.00	2.71	0.78	222.0	2.70	9.2
GT- 37	23.50	2.70	0.89	188.0	2.69	7.8
GT- 39	8.00	2.68	1.16	193.0	2.69	8.0
GT- 39	9.00	2.70	1.02	211.0	2.69	8.7
GT- 39	10.00	2.69	0.79	205.0	2.68	8.5
GT- 39	11.50	2.71	1.19	213.0	2.71	8.8
GT- 40	3.00	2.70	1.08	193.0	2.71	8.0
GT- 40	4.50	2.71	0.94	211.0	2.72	8.7
GT- 40	6.00	2.69	1.19	179.0	2.70	7.4
GT- 40	7.00	2.72	0.87	220.0	2.72	9.1

M/S ANAND RAJ INFRATECH PVT. LTD.

LABORATORY TEST RESULTS OF ROCK SAMPLES

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No.	**Depth** (m)	**Unit Weight** (gm/cc)	**Water Absorption** (%)	**Crushing Strength** *(kg/cm^2)*	**Specific Gravity** (%)	**Point Load** *(kg/cm^2)*
GT- 36B	7.50	2.71	1.02	204.0	2.73	8.5
GT- 36B	8.50	2.74	0.77	229.0	2.74	9.5
GT- 36B	9.50	2.67	1.44	171.0	2.71	7.1
GT- 36B	11.00	2.69	1.25	190.0	2.70	7.9
GT- 44A	13.50	2.75	0.71	238.0	2.74	9.9
GT- 44A	15.00	2.73	0.89	212.0	2.73	8.8
GT- 44A	16.50	2.70	1.13	198.0	2.71	8.2
GT- 44A	17.50	2.68	1.31	167.0	2.70	6.9
GT- 44B	19.00	2.66	1.52	153.0	2.69	6.3
GT- 44B	20.00	2.76	0.65	243.0	2.73	10.1
GT- 44B	21.00	2.75	0.83	256.0	2.74	10.6
GT- 44B	22.00	2.80	0.48	283.0	2.75	11.7
GT- 44B	23.00	2.77	0.96	262.0	2.74	10.9

LABORATORY TEST RESULTS OF ROCK SAMPLES

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No.	**Depth** (m)	**Unit Weight** (gm/cc)	**Water Absorption** (%)	**Crushing Strength** *(kg/cm^2)*	**Specific Gravity** (%)	**Point Load** *(kg/cm^2)*
GT- 42	6.00	2.66	1.35	151.0	2.70	6.2
GT- 42	7.50	2.64	1.43	136.0	2.69	5.6
GT- 42	9.00	2.68	1.10	169.0	2.69	7.0
GT- 42	10.00	2.67	1.13	158.0	2.69	6.5
GT- 42	11.00	2.68	1.07	174.0	2.70	7.2
GT- 42	12.00	2.66	1.24	140.0	2.70	5.8
GT- 42	13.00	2.65	1.31	132.0	2.70	5.5
GT- 43	4.50	2.66	1.15	153.0	2.71	6.3
GT- 43	6.00	2.65	1.27	144.0	2.69	6.0
GT- 43	7.50	2.67	1.22	165.0	2.70	6.8
GT- 43	8.50	2.69	1.09	187.0	2.70	7.8

LABORATORY TEST RESULTS OF ROCK SAMPLES

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No.	**Depth** (m)	**Unit Weight** (gm/cc)	**Water Absorption** (%)	**Crushing Strength** *(kg/cm^2)*	**Specific Gravity** (%)	**Point Load** *(kg/cm^2)*
GT- 44	17.00	2.69	1.16	188.0	2.70	7.7
GT- 44	18.00	2.70	0.98	214.0	2.70	8.9
GT- 44	19.00	2.72	0.73	230.0	2.72	9.5
GT- 44	20.50	2.73	0.57	253.0	2.72	10.5
GT- 45	2.00	2.63	1.39	135.0	2.69	5.6
GT- 45	3.00	2.65	1.28	143.0	2.69	5.9
GT- 45	4.50	2.69	1.04	168.0	2.70	7.0
GT- 45	5.50	2.68	1.26	161.0	2.70	6.7
GT- 45	6.50	2.67	1.19	155.0	2.70	6.4
GT- 46	1.10	2.62	1.61	126.0	2.71	5.2
GT- 46	2.60	2.68	1.28	177.0	2.71	7.3

LABORATORY TEST RESULTS OF ROCK SAMPLES

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No.	**Depth** (m)	**Unit Weight** (gm/cc)	**Water Absorption** (%)	**Crushing Strength** *(kg/cm^2)*	**Specific Gravity** (%)	**Point Load** *(kg/cm^2)*
GT- 46	4.10	2.71	0.99	208.0	2.69	8.6
GT- 46	5.60	2.69	1.16	189.0	2.69	7.8
GT- 46	6.60	2.70	1.01	201.0	2.69	8.3
GT- 47	11.00	2.61	1.73	125.0	2.68	5.2
GT- 47	12.00	2.61	1.78	120.0	2.68	5.0
GT- 49	12.70	2.71	0.81	217.0	2.72	9.0
GT- 49	13.70	2.70	1.04	182.0	2.70	7.5
GT- 49	14.70	2.69	1.13	193.0	2.70	8.0
GT- 49	16.20	2.70	0.93	189.0	2.71	7.8

CHEMICAL TEST RESULTS ON SOIL AND GROUND WATER SAMPALE

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Chemical Tests on Soil samples					Chemical Tests on Water samples		
Borehole No.	**Depth (m)**	**pH Value**	**Chloride(%)**	**Sulphate (%)**	**pH Value**	**Chloride (mg/litre)**	**Sulphate (mg/litre)**
GT-01	3.00	6.6	0.02	0.07	7.1	61.50	251.00
	12.00	6.8	0.01	0.06			
	21.00	6.7	0.02	0.05			
GT-02	1.50	6.9	0.00	0.06	7.2	66.20	263.00
	7.50	6.7	0.02	0.07			
	19.50	6.8	0.03	0.06			
GT-04	3.00	6.6	0.02	0.07	7.0	71.40	255.00
	10.50	6.9	0.03	0.06			
	18.00	6.8	0.02	0.07			
GT-05	1.50	6.8	0.03	0.08	6.9	65.30	270.00
	7.50	6.8	0.03	0.06			
	15.00	6.9	0.02	0.07			
GT-06	3.00	6.8	0.02	0.06	7.0	70.50	257.00
	6.00	6.6	0.03	0.05			
	18.00	6.7	0.02	0.06			
GT-07	3.00	6.8	0.01	0.05	6.8	63.90	268.00
	6.00	6.8	0.03	0.07			
	12.00	6.7	0.02	0.06			
GT-08	1.50	6.7	0.02	0.08	7.1	59.50	252.00
	3.00	6.6	0.03	0.07			
	6.50	6.8	0.01	0.05			
GT-09	3.00	6.7	0.02	0.06	6.9	59.80	270.00
	12.50	6.6	0.03	0.05			
	20.50	6.8	0.02	0.06			
GT-10	3.00	6.9	0.03	0.07	7.0	64.20	267.00
	7.50	6.8	0.02	0.07			
	13.50	6.7	0.02	0.08			

CHEMICAL TEST RESULTS ON SOIL AND GROUND WATER SAMPALE

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

		Chemical Tests on Soil samples			**Chemical Tests on Water samples**		
Borehole No.	**Depth (m)**	**pH Value**	**Chloride(%)**	**Sulphate (%)**	**pH Value**	**Chloride (mg/litre)**	**Sulphate (mg/litre)**
GT-11	2.50	6.8	0.03	0.06	7.0	60.90	254.00
	10.50	6.7	0.03	0.05			
	25.50	6.9	0.02	0.06			
GT-12	3.00	6.8	0.02	0.06	7.1	63.20	258.00
	7.50	6.6	0.03	0.05			
	19.50	6.7	0.02	0.07			
GT-13	5.00	6.8	0.03	0.06	7.0	61.60	251.00
	17.00	6.7	0.02	0.05			
GT-14	1.50	6.8	0.02	0.07	7.2	63.80	268.00
	10.50	6.7	0.03	0.05			
	21.50	6.8	0.02	0.06			
GT-15	3.00	6.9	0.02	0.06	7.3	69.40	266.00
	7.50	6.8	0.01	0.08			
	16.50	6.8	0.02	0.07			
GT-16	4.50	6.9	0.02	0.08	7.2	78.90	257.00
	16.50	7.0	0.03	0.07			
	30.00	6.8	0.03	0.07			
GT-17	3.00	6.7	0.03	0.08	7.1	77.20	273.00
	10.50	6.7	0.04	0.07			
	28.50	6.8	0.03	0.07			
GT-18	2.00	6.8	0.03	0.07	7.1	71.10	269.00
	13.50	6.7	0.03	0.06			
	34.50	6.7	0.02	0.07			
GT-19	3.00	6.6	0.03	0.07	7.0	73.30	265.00
	10.50	6.8	0.03	0.06			
GT-20	4.50	6.6	0.02	0.07	7.2	70.70	264.00
	13.50	6.8	0.03	0.08			
	28.50	6.8	0.03	0.08			

CHEMICAL TEST RESULTS ON SOIL AND GROUND WATER SAMPALE

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

		Chemical Tests on Soil samples			**Chemical Tests on Water samples**		
Borehole No.	**Depth (m)**	**pH Value**	**Chloride(%)**	**Sulphate (%)**	**pH Value**	**Chloride (mg/litre)**	**Sulphate (mg/litre)**
GT-21	3.00	6.8	0.02	0.08	7.3	70.40	249.00
	6.00	6.5	0.03	0.06			
GT-22	4.00	6.8	0.03	0.07	7.2	63.30	267.60
	16.50	6.8	0.03	0.08			
	25.50	6.7	0.02	0.08			
GT-23	3.00	6.7	0.02	0.05	7.0	56.50	272.00
	6.00	6.8	0.03	0.06			
GT-24	2.00	6.8	0.03	0.06	7.1	51.70	251.00
	7.50	6.9	0.02	0.07			
	19.50	6.7	0.01	0.08			
GT-25	5.00	6.7	0.02	0.05	7.2	59.40	258.00
	25.50	6.6	0.01	0.06			
GT-26	2.00	6.8	0.02	0.06	7.1	65.30	270.00
	13.50	6.6	0.03	0.07			
GT-27	4.50	6.7	0.03	0.07	7.0	60.80	252.00
	13.50	6.8	0.04	0.08			
GT-28	3.00	6.8	0.02	0.08	6.9	69.30	249.00
	10.50	6.5	0.03	0.06			
GT-29	1.50	6.8	0.03	0.07	7.0	62.70	255.00
	7.50	6.8	0.03	0.08			
	25.50	6.7	0.02	0.08			
GT-30	3.00	6.7	0.02	0.05	7.1	59.20	264.00
	7.50	6.8	0.03	0.06			

CHEMICAL TEST RESULTS ON SOIL AND GROUND WATER SAMPALE

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

		Chemical Tests on Soil samples			**Chemical Tests on Water samples**		
Borehole No.	**Depth (m)**	**pH Value**	**Chloride(%)**	**Sulphate (%)**	**pH Value**	**Chloride (mg/litre)**	**Sulphate (mg/litre)**
GT-31	1.50	6.8	0.01	0.06	7.2	69.30	262.00
	10.50	6.7	0.02	0.07			
	22.50	6.6	0.03	0.08			
GT-32	3.00	6.7	0.01	0.06	7.0	58.10	272.00
	6.00	6.8	0.02	0.05			
GT-33	3.00	6.7	0.04	0.07	7.3	75.40	255.00
	13.50	6.9	0.02	0.06			
GT-34	1.50	6.8	0.03	0.08	7.1	80.50	265.00
	7.50	6.7	0.02	0.06			
	13.50	6.6	0.04	0.06			
GT-35	1.50	6.8	0.03	0.07	7.0	78.20	276.00
	7.50	6.8	0.02	0.06			
	16.50	6.7	0.02	0.07			
GT-36	0.00	6.9	0.02	0.06	6.8	67.00	256.00
GT-36B	3.00	6.7	0.01	0.06	7.2	75.10	263.00
	4.50	6.8	0.02	0.07			
	6.00	6.6	0.03	0.08			
GT-37	3.00	6.8	0.03	0.08	7.0	70.00	261.00
	6.00	6.9	0.02	0.06			
	18.00	6.8	0.02	0.05			
GT-38	3.00	6.7	0.03	0.07	6.9	73.30	257.00
	10.50	6.9	0.03	0.06			
	25.00	6.9	0.02	0.07			
GT-39	4.50	6.8	0.01	0.07	7.1	71.20	249.00
	7.50	6.6	0.02	0.08			
GT-40	1.50	6.6	0.04	0.07	6.8	73.30	257.00
	3.00	6.7	0.03	0.05			

CHEMICAL TEST RESULTS ON SOIL AND GROUND WATER SAMPALE

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Chemical Tests on Soil samples					**Chemical Tests on Water samples**		
Borehole No.	**Depth (m)**	**pH Value**	**Chloride(%)**	**Sulphate (%)**	**pH Value**	**Chloride (mg/litre)**	**Sulphate (mg/litre)**
GT-41	3.00	6.6	0.01	0.06	7.1	69.30	262.00
	7.50	6.7	0.02	0.07			
	16.50	6.8	0.03	0.08			
GT-42	1.50	6.7	0.04	0.07	7.2	75.40	255.00
	4.50	6.6	0.02	0.06			
GT-43	1.50	6.7	0.03	0.07	7.0	78.20	276.00
	4.50	6.8	0.02	0.06			
GT-44	3.00	6.5	0.03	0.08	7.1	70.00	261.00
	6.00	6.6	0.02	0.06			
	10.50	6.8	0.02	0.05			
GT-44A	1.50	6.7	0.03	0.08	7.1	81.00	269.00
	4.50	6.8	0.02	0.06			
	6.00	6.6	0.04	0.06			
GT-44B	2.00	6.5	0.03	0.07	7.0	77.90	274.00
	5.00	6.6	0.02	0.06			
	12.00	6.7	0.02	0.07			
GT-45	1.50	6.7	0.03	0.07	7.0	73.30	257.00
GT-46	4.50	6.6	0.01	0.07	7.2	71.20	249.00
GT-47	3.00	6.7	0.04	0.07	7.1	70.70	266.00
	7.50	6.9	0.03	0.04			
GT-48	1.50	6.8	0.02	0.05	7.0	67.40	271.00
	6.00	6.7	0.03	0.05	7.1	61.20	279.00
	18.50	6.6	0.02	0.06			
GT-49	1.50	6.5	0.01	0.05	6.9	64.80	264.00
	4.50	6.7	0.01	0.05			
	10.50	6.6	0.03	0.06			

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Notation
DS :Disturbed Sample — CS:Rock core sample
UDS :Undisturbed sample — RQD:Rock Quality Designation
SL :Slipped — CR:Core Recovery
TS :Triaxial test(UU) — DT : Direct Shear test
W.A. :Water absorption — Ws :Shrinkage Limit

Location: Approach Of Chithrapuzha River
Chainage 193+600
Bore Hole No: GT 50B
R.L. of BH (m): 3.700
Termination Depth of Borehole : 23.10m

Date of starting:17.11.19
Date of completion:19.11.19
Period of Lab.Test:08.01.20 to 17.01.20

Static Ground Water Table:+3.00m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°0'02"N 76°22'08"E

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws(%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00							▨	Top surface soil followed by reddish brown Moorum	0.00	3.7																			
0.50	DS	0.50							to	to	SC	7	56	22	15					32	19	13							
1.00									1.50	2.20																			
1.50	DS	1.50-1.95	1.50	2			▒	Very soft,blackish grey silty clay with some decomposed organic matter.Fine sand observed in traces.	1.50	2.20																	-		
2.00																													
2.50																													
3.00	UDS	3.0-3.45									OH	0	2	53	45	49.0	1.54	1.03	2.52	60	45	15	6.0	UU	0.15	0.0	0.22	0.45	1.44
3.50									to	to																			
4.00																													
4.50	DS	4.50-4.95	4.50	2							OH	0	3	51	46					65	46	19							
5.00																													
5.50									6.00	-2.30																			
6.00	UDS	6.0-6.45					╲	Stiff,brownish / yellowish grey silty clay with some sand and calcareous nodules.	6.00	-2.30	CI	0	18	61	21	28.0	1.89	1.48	2.68	38	22	16	15	UU	0.50	6.0	0.89	0.16	0.82
6.50																													
7.00																													
7.50	DS	7.50-7.95	7.50	12							CI	0	15	60	25					38	21	17							
8.00																													
8.50									to	to																			
9.00																													
9.50																													
10.00																													
10.50	DS	10.50-10.95	10.50	15					11.10	-7.40																			
11.00	CS	11.10-12.60	11.10	100 blows for 3cm	3.00	0.0	v v v	Highly weathered,thickly bedded,disintegrated,brownish grey,very weak,coarse grained Quartzite Gneiss.	11.10	-7.40	Metamorphic Rock																		
11.50							v v v																						
12.00							v v v																						
12.50	CS	12.60-14.10	12.60	100 blows for 5cm	3.66	0.00	v v v																						
13.00							v v v		to	to																			
13.50							v v v																						
14.00	CS	14.10-15.10	14.10	100 blows for 4cm	9.00	0.00	v v v																						
14.50							v v v																						
15.00							v v v		17.10	-13.4																			

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Approach Of Chithrapuzha River
Chainage 193+600
Bore Hole No: GT 50B
R.L. of BH (m): 3.700
Termination Depth of Borehole : 23.10m

Date of starting:17.11.19
Date of completion:19.11.19
Period of Lab.Test:08.01.20 to 17.01.20

Static Ground Water Table:+3.00m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°0'02"N 76°22'08"E

Notation			
DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT Depth (m)	SPT Observed"N" Value	Rock Sample CR (%)	Rock Sample RQD (%)	Log Symbol	Description of Strata	Strata Depth (m) From / To	RL	IS classification	% Gravel	% Sand	% Silt	% clay	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	LL (%)	PL (%)	PI(%)	Ws(%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
15.50	CS	15.10-16.10	15.10	100 blows for 3cm	14.00	0.00	v v v	-do-			Metamorphic Rock																		
16.00							v v v																						
16.50	CS	16.10-17.10	16.10	100 blows 1for 4cm	25.00	0.00	v v v																						
17.00							v v v																						
17.50	CS	17.10-18.10			52.30	25.00	v v v	Moderately weathered to fresh,brownish grey,fine grained,moderately strong & hard Quartzite Gneiss.	17.10	-13.4																			
18.00	CS	18.10-19.60			73.30	60.60	v v v																						
18.50							v v v																						
19.00							v v v																						
19.50	CS	19.60-21.10			70.60	56.00	v v v																						
20.00							v v v																						
20.50							v v v		to	to																			
21.00	CS	21.10-22.10			82.00	51.00	v v v																						
21.50							v v v																						
22.00	CS	22.10-23.10			80.00	68.00	v v v																						
22.50							v v v																						
23.00							v v v		23.10	-19.4																			
23.50																													
24.00																													
24.50																													
25.00																													
25.50																													
26.00																													
26.50																													
27.00																													
27.50																													
28.00																													
28.50																													
29.00																													
29.50																													
30.00																													

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)		Point Load strength,
18.10-19.60	2.85	0.20	2.83	273.00		12.00
19.60-21.10	2.88	0.10	2.85	287.00		12.00
21.10-22.10	2.85	0.20	2.85	274.00		13.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Kakkanad
Chainage 195+375
Bore Hole No: GT 51A
R.L. of BH (m): 3.100
Termination Depth of Borehole : 24.00m

Date of starting:20.11.19
Date of completion:23.11.19
Period of Lab.Test:08.01.20 to 17.01.20

Static Ground Water Table: +1.15m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°0'48"N 76°22'41"E

Notation

DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws(%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00								Top surface soil followed by very stiff,reddish yellow silty clay with some moorum.	0.00	3.10																			
0.50	DS	0.50																											
1.00																													
1.50	DS	1.50-1.95	1.50	20							CI	6	28	49	17				2.68	39	22	17	19		0.90	5.0	-		
2.00																									(suggested)				
2.50																													
3.00	DS	3.0-3.45	3.00	23					to	to	SC	24	40	23	13					32	20	12							
3.50																													
4.00																													
4.50	DS	4.50-4.95	4.50	21							CI	13	30	39	18					39	22	17							
5.00																													
5.50									6.00	-2.90																			
6.00	UDS	6.0-6.45						Soft,blackish grey silty clay with traces of decomposed organic matter.Fine sand observed in traces.	6.00	-2.90	CI	0	3	76	21	29.0	1.80	1.40	2.68	40	21	19	14	UU	0.20	0.0	0.45	0.25	0.92
	(slipped)															(suggested)									(remolded)				
6.50	DS	6.50-6.95	6.50	2																									
7.00																													
7.50	DS	7.50-7.95	7.50	5							CI	0	3	77	20					39	20	19							
8.00																													
8.50																													
9.00																													
9.50									to	to																			
10.00	DS	10.0-10.45	10.00	4							CI	0	5	77	18					40	18	22							
10.50																													
11.00																													
11.50																													
12.00																													
12.50																													
13.00																													
13.50	UDS	13.50-13.95							14.00	-10.9	CI	0	4	71	25	30.0	1.82	1.40	2.68	40	20	20		UU	0.25	0.0	0.60	0.23	0.91
14.00								Completely weathered rock converted to residual soil.	14.00	-10.9																			
14.50									to	to																			
15.00	DS	15.0-15.05	15.00	100 blows for 5 cm					16.00	-12.9	SM	20	65	← 15 →						Non Plastic									

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Kakkanad

Chainage 195+375

Bore Hole No: GT 51A

R.L. of BH (m): 3.100

Termination Depth of Borehole : 24.00m

Date of starting:20.11.19

Date of completion:23.11.19

Period of Lab.Test:08.01.20 to 17.01.20

Static Ground Water Table: +1.15m

Method of boring : Rotary Mud Circulation, Rotary Drilling

Type of bit used:TC/Diamond

Co -ordinate 10°0'48"N 76°22'41"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws(%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e$_0$
15.50							▨	-do-																					
16.00	DS	16.0-17.50	16.00	100 blows for1cm	32.60	0.0	v v	Highly weathered,thickly bedded,disintegrated, brownish grey,very weak,coarse grained Quarzite Gneiss.	16.00	-12.9	Metamorphic Rock																		
16.50							v v																						
17.00							v v		to	to																			
17.50	CS	17.50-19.0			34.66	0.0	v v																						
18.00							v v																						
18.50							v v		19.00	-15.9																			
19.00	CS	19.0-20.0			74.00	54.0	v v	Slightly weathered to fresh,brownish grey,fine grained,,moderately strong & hard Biotite Gneiss.	19.00	-15.9																			
19.50							v v																						
20.00	CS	20.0-21.5			82.00	58.6	v v																						
20.50							v v																						
21.00							v v v		to	to																			
21.50	CS	21.50-23.0			75.00	56.0	v v																						
22.00							v v																						
22.50							v v																						
23.00	CS	23.0-24.0			70.00	51.0	v v																						
23.50							v v																						
24.00							v v		24.00	-20.9																			
24.50																													
25.00																													
25.50																													
26.00																													
26.50																													
27.00																													
27.50																													
28.00																													
28.50																													
29.00																													
29.50																													
30.00																													

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight (gm/cc)	Water Absorption .(%)	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
19.0-20.0	2.86	0.15	2.86	278.00	10.00
20.0-21.50	2.89	0.20	2.85	281.00	13.00
21.50-23.0	2.88	0.30	2.78	274.00	13.00
23.0-24.0	2.82	0.20	2.83	274.00	12.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Kakkanad- Pallikkara Rd,Manakkakadavu Bus Stop

Chainage 199+790

Bore Hole No: GT 52A

R.L. of BH (m): 6.000

Termination Depth of Borehole : 13.80m

Date of starting:19.11.19

Date of completion:20.11.19

Period of Lab.Test:08.01.20 to 17.01.20

Static Ground Water Table: +5.0m

Method of boring : Rotary Mud Circulation, Rotary Drilling

Type of bit used:TC/Diamond

Co -ordinate 10°03'2.8"N 76°23'27.3"E

Notation			
DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT Depth (m)	SPT Observed"N" Value	Rock Sample CR (%)	Rock Sample RQD (%)	Log Symbol	Description of Strata	Strata Depth (m) From / To	Strata Depth (m) RL	IS classification	Grain Size Distribution % Gravel	% Sand	% Silt	% clay	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits LL (%)	PL (%)	PI(%)	Ws(%)	Shearing Strength characteristic Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Consolidation Characteristic Cc	e_0
0.00							▦	Top surface soil followed by stiff,brownish grey, silty clay with good percentage of sand.	0.00	6.0																			
0.50	DS	0.50-0.95	0.50	9							CL	6	21	59	14					30	19	11							
1.00																													
1.50																											-		
2.00																													
2.50									to	to																			
3.00	UDS	3.0-3.45 (slipped)									CL	0	34	54	12	24.0	1.89 (suggested)	1.52	2.64	34	22	12	22	UU	0.40	7.0	0.77 (remolded)	0.17	0.73
3.50	DS	3.50-3.95	3.50	13																									
4.00									4.50	1.50																			
4.50	DS	4.50-4.95	4.50	45			▦	Hard to too hard,brownish grey silty clay with good percentage of calcareous nodules and sand.	4.50	1.50	CL	19	18	48	15	18.0	2.00		2.68	33	20	13			1.50 (suggested)			0.12	0.68 (Suggested)
5.00																													
5.50									to	to																			
6.00	DS	6.0-6.45	6.00	50							CL	21	21	40	18					34	22	12							
6.50																													
7.00									7.30	-1.30																			
7.50	CS	7.30-8.80	7.30	Refusal	42.00	18.60	v v v	Slightly weathered to fresh,brownish grey,fine grained, moderately strong & hard Quartzite Gneiss.	7.30	-1.30	Metamorphic Rock																		
8.00							v v v																						
8.50	CS	8.80-10.30			93.00	82.00	v v v																						
9.00							v v v																						
9.50							v v v																						
10.00	CS	10.30-11.30			80.00	55.00	v v v																						
10.50							v v v		to	to																			
11.00							v v v																						
11.50	CS	11.30-12.80			86.00	59.00	v v v																						
12.00							v v v																						
12.50							v v v																						
13.00	CS	12.80-13.80			90.00	53.00	v v v																						
13.50							v v v																						
14.00							v v v		13.80	-7.80																			
14.50																													
15.00																													

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)		Point Load strength,
8.80-10.30	2.80	0.50	2.68	270.00		9.00
11.30-12.80	2.78	0.60	2.72	278.00		11.00
12.80-13.80	2.80	0.20	2.79	270.00		12.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Notation			
DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Location: Edathala ,
Chainage 204+100
Bore Hole No: GT 53A
R.L. of BH (m): 26.200
Termination Depth of Borehole :17.50m

Date of starting:14.11.19
Date of completion:16.11.19
Period of Lab.Test:08.01.20 to 17.01.20

Static Ground Water Table:+20.48m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°05'21"N 76°23'52"E

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws(%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00							▨	Top surface soil followed by too hard reddish brown Moorum.	0.00	26.2																			
0.50	DS	0.50					▨		to	to																			
1.00	DS	1.00					▨				SC	7	52	25	16				2.69	34	19	15							
1.50	DS	1.50-1.95	1.50	51			▨		2.00	24.20																	-		
2.00							▨	Too hard,light brown with blackish laminated, sandy silty clay with some gravels and calcareous nodules.	2.00	24.2																			
2.50							▨																						
3.00	DS	3.0-3.45	3.00	59			▨				CI	3	21	55	21					40	21	19							
3.50							▨																						
4.00							▨																						
4.50	DS	4.50-4.95	4.50	67			▨																						
5.00							▨																						
5.50							▨																						
6.00	DS	6.0-6.45	6.00	36			▨				CL	2	13	72	13	21.0	1.95	1.61	2.64	31	19	12	22	UU	1.40	5.0		0.11	0.64
6.50							▨																		(Remolded)				
7.00							▨		to	to																			
7.50	DS	7.50-7.95	7.50	38			▨																						
8.00							▨																						
8.50							▨																						
9.00							▨																						
9.50							▨																						
10.00							▨																						
10.50	DS	10.50-10.95	10.50	40			▨				CL	0	27	59	14					33	20	13							
11.00							▨																						
11.50							▨																						
12.00							▨		12.50	13.70																			
12.50	CS	12.50-14.0	12.50	Refusal	65.30	56.00	v v v	Moderately fresh,brownish grey,medium / fine grained,moderately strong & hard Biotite Gneiss.	12.50	13.70	Metamorphic Rock																		
13.00							v v v																						
13.50							v v v		to	to																			
14.00	CS	14.0-15.50			53.30	50.66	v v v																						
14.50							v v v																						
15.00							v v v		17.50	8.70																			

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength,
12.50-14.0	2.78	0.50	2.75	270.00	12.00
14.0-15.50	2.80	0.80	2.78	268.00	14.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Edathala ,
Chainage 204+100
Bore Hole No: GT 53A
R.L. of BH (m): 26.200
Termination Depth of Borehole :17.50m

Date of starting:14.11.19
Date of completion:16.11.19
Period of Lab.Test:08.01.20 to 17.01.20

Static Ground Water Table:+20.48m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°05'21"N 76°23'52"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws(%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
15.50	CS	15.50-16.50			69.00	54.00	v v v	-do-			Metamorphic Rock																		
16.00							v v v																						
16.50	CS	16.50-17.50			72.00	55.00	v v v																						
17.00							v v v																						
17.50							v v v																						
18.00																													
18.50																													
19.00																													
19.50																													
20.00																													
20.50																													
21.00																													
21.50																													
22.00																													
22.50																													
23.00																													
23.50																													
24.00																													
24.50																													
25.00																													
25.50																													
26.00																													
26.50																													
27.00																													
27.50																													
28.00																													
28.50																													
29.00																													
29.50																													
30.00																													

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Approach Of Periyar River
Chainage 207+880
Bore Hole No: GT 54
R.L. of BH (m): 15.700
Termination Depth of Borehole : 28.62m

Date of starting:10.11.19
Date of completion:13.11.19
Period of Lab.Test:08.01.20 to 17.01.20

Static Ground Water Table:+15.15m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°07'06"N 76°23'10"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws(%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00							▥	Top surface soil followed by medium dense,brownish grey micaceous sandy silt.	0.00	15.7																			
0.50	DS	0.50																											
1.00	DS	0.85							to	to	ML	0	24	73	3					25	23	2							
1.50	DS	1.50-1.95	1.50	13					2.00	13.70																	-		
2.00							▩	Medium to dense,brownish grey silty micaceous fine to medium sand.	2.00	13.7																			
2.50																													
3.00	DS	3.0-3.45	3.00	22							SM	0	78	← 22 →			1.85		2.65	Non Plastic				DT	0.00	31.0			
3.50																									(Remolded)				
4.00									to	to																			
4.50	DS	4.50-4.95	4.50	34							SM	0	75	← 25 →						Non Plastic									
5.00																													
5.50									6.00	9.70																			
6.00	DS	6.0-6.45	6.00	53			▩	Very dense,brownish yellow with grey laminated fine to medium sand with traces of fines.Little angular gravels observed occasionally.	6.00	9.7																			
6.50																													
7.00																													
7.50	DS	7.50-7.95	7.50	62							SP	0	97	← 3 →			2.00		2.62	Non Plastic				DT	0.00	35.0			
8.00																									(Remolded)				
8.50																													
9.00																													
9.50																													
10.00																													
10.50	DS	10.50-10.95	10.50	75					to	to	SP	0	98	← 2 →						Non Plastic									
11.00																													
11.50																													
12.00																													
12.50																													
13.00																													
13.50	DS	13.50-13.95	13.50	83							SP	0	99	← 1 →			2.00		2.61	Non Plastic				DT	0.00	36.0			
14.00																									(Remolded)				
14.50																													
15.00									26.50	-10.8																			

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Approach Of Periyar River
Chainage 207+880
Bore Hole No: GT 54
R.L. of BH (m): 15.700
Termination Depth of Borehole : 28.62m

Date of starting:10.11.19
Date of completion:13.11.19
Period of Lab.Test:08.01.20 to 17.01.20

Static Ground Water Table:+15.15m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°07'06"N 76°23'10"E

Notation
DS :Disturbed Sample
UDS :Undisturbed sample
SL :Slipped
TS :Triaxial test(UU)
W.A. :Water absorption
CS:Rock core sample
RQD:Rock Quality Designation
CR:Core Recovery
DT : Direct Shear test
Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws(%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
15.50																													
16.00																													
16.50	DS	16.50-16.95	16.50	76							SP	0	98	← 2 →						Non Plastic									
17.00																													
17.50																													
18.00																													
18.50																													
19.00																													
19.50	DS	19.50-19.95	19.50	60							SP	0	98	← 2 →						Non Plastic									
20.00																													
20.50																													
21.00								-do-																					
21.50																													
22.00																													
22.50	DS	22.50-22.95	22.50	39							SP	0	96	← 4 →			1.93		2.68	Non Plastic				DT	0.00	34.0			
23.00																									(Remolded)				
23.50	DS	23.50-23.95	23.50	108																									
24.00																													
24.50																													
25.00																													
25.50																													
26.00																													
26.50	DS	26.50-26.83	26.50	>100 blows for 3cm				Very dense,grey with brown laminated silty medium sand with little calcareous nodules.Fragmented rock observed	26.50	-10.8																			
27.00																													
27.50																													
28.00									to	to																			
28.50	DS	28.50-28.62	28.50	100 blows for 12cm							SM	5	81	← 14 →			2.00		2.62	Non Plastic				DT	0.00	36.0			
29.00									28.62	-12.9															(Remolded)				
29.50																													
30.00																													

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Nedumbassery
Chainage 210+500
Bore Hole No: GT 55A
R.L. of BH (m): 2.900
Termination Depth of Borehole : 15.50m

Date of starting:17.11.19
Date of completion:18.11.19
Period of Lab.Test :04.2.20 to 12.2.20

Static Ground Water Table:+0.90m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°08'24"N 76°22'43"E

Notation			
DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT Depth (m)	SPT Observed"N" Value	Rock Sample CR (%)	Rock Sample RQD (%)	Log Symbol	Description of Strata	Strata Depth (m) From / To	Strata Depth (m) RL	IS classification	Grain Size Distribution % Gravel	% Sand	% Silt	% clay	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits LL (%)	PL (%)	PI(%)	Ws (%)	Shearing Strength characteristic Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Consolidation Characteristic Cc	e_0
0.00								Top surface soil followed by stiff,reddish grey silty clay with some sand and kankar.	0.00	2.90																			
0.50																													
1.00																													
1.50	DS	1.50-1.95	1.50	12					to	to	CI	0	18							40	21						-		
2.00																													
2.50																													
3.00	UDS	3.0-3.45									CI	4	17	56	23	27.0	1.88	1.48	2.65	39	21	18	17	TS	0.55	5.0	1.40	0.20	0.79
3.50	DS	3.50-3.95	3.50	16					4.00	-1.10																			
4.00								Loose,brownish grey silty fine to medium sand.Lenses of mica observed scatterdly.	4.00	-1.10																			
4.50	DS	4.50-4.95	4.50	5							SM	0	76	← 24 →						Non Plastic									
5.00																													
5.50																													
6.00	DS	6.0-6.45	6.00	7							SM	0	72	← 28 →			1.80			Non Plastic					0.00	28.0			
6.50																	(Suggested)								(Suggested)				
7.00									to	to																			
7.50	DS	7.50-7.95	7.50	8							SM	0	78	← 22 →						Non Plastic									
8.00																													
8.50																													
9.00																													
9.50																													
10.00									10.50	-7.60																			
10.50	CS	10.50-12.00	10.50	Refusal	82.0	50.60	v v v	Slightly weathered to fresh,dark grey,fine grained,moderately strong & hard Hornblende Biotite Gneiss.	10.50	-7.60	Metamorphic Rock																		
11.00							v v v																						
11.50							v v v																						
12.00	CS	12.0-13.50			88.0	46.00	v v v																						
12.50							v v v																						
13.00							v v v		to	to																			
13.50	CS	13.50-14.50			91.0	91.00	v v v																						
14.00							v v v																						
14.50	CS	14.50-15.50			98.0	89.00	v v v																						
15.00							v v v																						
15.50							v v v		15.50	-12.60																			

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
10.20-12.30	2.78	0.50	2.80	266.00	13.00
13.50-14.50	2.80	0.60	2.82	271.00	10.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Approach of Manjally River
Chainage 217+110
Bore Hole No: GT 56A
R.L. of BH (m) 4.300
Termination Depth of Borehole : 21.00m

Date of starting:13.11.19
Date of completion:16.11.19
Period of Lab.Test :23.02.20 to 13.3.20

Static Ground Water Table:+3.30m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°11'42"N 76°22'0"E

Notation			
DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00							▨	Top suface soil followd by stiff to very stiff ,reddish brown with grey laminated silty clay.Sand pockets observed from 3.0m to 3.50m depth.Good percentage of calcareous nodules observed closely.	0.00	4.30																			
0.50																													
1.00																						0							
1.50	DS	1.50-1.95	1.50	12							CI	4	21	54	21	25.0	1.88	1.50	2.68	39	18	21	18		0.75	0.0	-	0.15	0.78
2.00																	(Suggested)									(Suggested)			
2.50																													
3.00	DS	3.0-3.45	3.00	15,30,100blows for 6cm							SM	32	38	←30→						Non Plastic									
3.50									to	to																			
4.00																													
4.50	DS	4.50-4.95	4.50	31							CI	2	21	53	24	20.0	2.00	1.67	2.66	41	19	22	16		1.90	0.0		0.10	0.60
5.00																	(Suggested)									(Suggested)			
5.50																													
6.00	DS	6.0-6.45	6.00	36																									
6.50																													
7.00									7.50	-3.20																			
7.50	CS	7.50-9.0	7.50	50 blows for 6cm	18	0	v v v	Highly weathered,disintegrated ,dark grey ,weak,foliated Mica Schist.	7.50	-3.20	Metamorphic Rock																		
8.00							v v																						
8.50							v v																						
9.00	CS	9.0-10.0			20.0	0.0	v v																						
9.50							v v																						
10.00	CS	10.0-11.0			35.0	0.0	v v																						
10.50							v v																						
11.00	CS	11.0-12.0			60.0	12.0	v v		to	to																			
11.50							v v																						
12.00	CS	12.0-13.0			54.0	0.0	v v																						
12.50							v v																						
13.00	CS	13.0-14.0			90.0	42.0	v v																						
13.50							v v																						
14.00	CS	14.0-15.0			89.0	42.0	v v																						
14.50							v v																						
15.00	CS	15.0-16.0			78.0	0.0	v v		21.00	-16.70																			

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight (gm/cc)	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength,
11.0-12.0	2.66	1.30	2.67	141.00	7.00
13.0-14.0	2.69	1.00	2.67	171.00	7.00
16.0-17.0	2.69	1.00	2.68	158.00	6.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Approach of Manjally River
Chainage 217+110
Bore Hole No: GT 56A
R.L. of BH (m) 4.300
Termination Depth of Borehole : 21.00m

Date of starting:13.11.19
Date of completion:16.11.19
Period of Lab.Test :23.02.20 to 13.3.20

Static Ground Water Table:+3.30m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°11'42"N 76°22'0"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
15.50							v v	-do-			Metamorphic Rock																		
16.00	CS	16.0-17.0			70.0	15.0	v v																						
16.50							v v																						
17.00	CS	17.0-18.0			74.0	14.0	v v																						
17.50							v v																						
18.00	CS	18.0-19.0			75.0	27.0	v v																						
18.50							v v																						
19.00	CS	19.0-20.0			45.0	10.0	v v																						
19.50							v v																						
20.00	CS	20.0-21.0			41.0	0.0	v v																						
20.50							v v																						
21.00							v v																						
21.50																													
22.00																													
22.50																													
23.00																													
23.50																													
24.00																													
24.50																													
25.00																													
25.50																													
26.00																													
26.50																													
27.00																													
27.50																													
28.00																													
28.50																													
29.00																													
29.50																													
30.00																													

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Approach of Chalakudy River
Chainage 222+355
Bore Hole No: GT 57B
R.L. of BH (m): 3.700
Termination Depth of Borehole : 13.13m

Date of starting:14.11.19
Date of completion:15.11.19
Period of Lab.Test:08.01.20 to 17.01.20

Static Ground Water Table:+3.0m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°13'36.4"N 76°19'55.2"E

Notation
DS :Disturbed Sample
UDS :Undisturbed sample
SL :Slipped
TS :Triaxial test(UU)
W.A. :Water absorption
CS:Rock core sample
RQD:Rock Quality Designation
CR:Core Recovery
DT : Direct Shear test
Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws(%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00								Top surface soil followed by medium stiff,brownish grey silty clay with some sand.	0.00	3.7																			
0.50																													
1.00																													
1.50	DS	1.50-1.95	1.50	7					to	to	CL	0	18	67	15	25.0	1.85		2.68	31	21	10	20		0.44	-	-	0.20	0.73
2.00																(Suggested)									(Suggested)			(Suggested)	
2.50									3.50	0.20																			
3.00	UDS	3.0-3.45						Loose,brownish grey,silty fine to medium sand.	3.50	0.2	SM	0	86	←14→						Non Plastic									
3.50	(Slipped)																												
4.00																													
4.50	DS	4.50-4.95	4.50	9					to	to	SM	0	87	←13→			1.80			Non Plastic					0.00	28.0			
5.00																	(Suggested)								(Suggested)				
5.50																													
6.00	DS	6.0-6.45	6.00	10																									
6.50									7.00	-3.30																			
7.00								Hard,brownish grey clayey medium to coarse sand	7.00	-3.3																			
7.50	DS	7.50-7.95	7.50	40					to 8.10	to -4.4	SC	8	67	14	11					30	18	12							
8.00	CS	8.10-9.50	8.10	Refusal	50.00	50.00	v v	Moderately weathered to fresh,brownish grey,fine grained,moderately strong & hard Quartzite Gneiss.	8.10	-4.4	Metamorphic Rock																		
8.50							v v																						
9.00							v v																						
9.50	CS	9.50-11.0			75.30	66.00	v v																						
10.00							v v																						
10.50							v v		to	to																			
11.00	CS	11.0-12.0			95.00	72.00	v v																						
11.50							v v																						
12.00	CS	12.0-13.10			100.00	93.00	v v																						
12.50							v v																						
13.00							v v		13.10	-9.40																			
13.50																													
14.00																													
14.50																													
15.00																													

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)		Point Load strength, kg/cm^2
8.10-9.50	2.78	0.30	2.75	278.00		10.00
9.50-11.0	2.81	0.20	2.78	265.00		13.00
11.0-12.0	2.78	0.60	2.78	268.00		10.00
12.0-13.10	2.78	0.20	2.86	285.00		14.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Kallur Vadakkummuri
Chainage 228+780
Bore Hole No: GT 58A
R.L. of BH (m): 3.800
Termination Depth of Borehole : 20.00m

Date of starting:11.11.19
Date of completion:12.11.19
Period of Lab.Test:08.01.20 to 17.01.20

Static Ground Water Table:+0.80m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°16'05.2"N 76°17'42.2"E

Notation

DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws(%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e$_0$
0.00							▩	Top surface soil followed by Stiff,brownish / yellowish grey silty clay with some sand and calcareous nodules.	0.00	3.8																			
0.50																													
1.00																													
1.50	DS	1.50-1.95	1.50	9							CL	0	37	47	16					33	22	11					-		
2.00																													
2.50																													
3.00	UDS	3.0-3.45									CL	0	28	58	14	25.0	1.88	1.50	2.69	33	19	14	22	UU	0.32	6.0	0.58	0.17	0.79
	(slipped)																(suggested)								(remolded)				
3.50	DS	3.50-3.95	3.50	8					to	to																			
4.00																													
4.50	DS	4.50-4.95	4.50	11							CI	0	7	70	23					39	21	18							
5.00																													
5.50																													
6.00	DS	6.0-6.45	6.00	13																									
6.50																													
7.00									7.50	-3.70																			
7.50	DS	7.50-7.95	7.50	9			▨	Stiff,blackish grey silty clay with some decomposed organic matter.Fine sand observed in traces.	7.50	-3.70	OH	0	3	57	40					58	40	18						0.43	1.45
8.00																												(Suggested)	
8.50																													
9.00																													
9.50																													
10.00									to	to	OH	0	3	52	45					62	41	21	7.0						
10.50	DS	10.50-10.95	10.50	11																									
11.00																													
11.50																													
12.00																													
12.50									13.00	-9.20																			
13.00							⁘	Dense,Light grey,silty medium to fine sand.Traces of mica observed occasionally.	13.00	-9.2																			
13.50	DS	13.50-13.95	13.50	32					to	to	SM	0	85	← 15 →						Non Plastic									
14.00																													
14.50									15.00	-11.2																			
15.00	CS	15.0-16.0	15.00	Refusal	85.00	61.00	v v v v v	Moderately weathered to fresh,dark grey,fine	15.00 to 20.0	-11.2 to -16.2	Metamorphic Rock																		

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Notation	
DS :Disturbed Sample	CS:Rock core sample
UDS :Undisturbed sample	RQD:Rock Quality Designation
SL :Slipped	CR:Core Recovery
TS :Triaxial test(UU)	DT : Direct Shear test
W.A. :Water absorption	Ws :Shrinkage Limit

Location: Kallur Vadakkummuri
Chainage 228+780
Bore Hole No: GT 58A
R.L. of BH (m): 3.800
Termination Depth of Borehole : 20.00m

Date of starting:11.11.19
Date of completion:12.11.19
Period of Lab.Test:08.01.20 to 17.01.20

Static Ground Water Table:+0.80m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°16'05.2"N 76°17'42.2"E

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT Depth (m)	SPT Observed"N" Value	Rock Sample CR (%)	Rock Sample RQD (%)	Log Symbol	Description of Strata	Strata Depth (m) From / To	RL	IS classification	% Gravel	% Sand	% Silt	% clay	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits LL (%)	PL (%)	PI(%)	Ws(%)	Shearing Strength characteristic Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Consolidation Characteristic Cc	e_0
15.50							v v	grained,,moderately strong & hard Biotite Gneiss.			Metamorphic Rock																		
16.00	CS	16.0-17.0			86.00	61.00	v v																						
16.50							v v																						
17.00	CS	17.0-18.0			83.00	73.00	v v																						
17.50							v v																						
18.00	CS	18.0-19.0			79.00	71.00	v v																						
18.50							v v																						
19.00	CS	19.00-20.0			100.00	97.00	v v																						
19.50							v v																						
20.00																													
20.50																													
21.00																													
21.50																													
22.00																													
22.50																													
23.00																													
23.50																													
24.00																													
24.50																													
25.00																													
25.50																													
26.00																													
26.50																													
27.00																													
27.50																													
28.00																													
28.50																													
29.00																													
29.50																													
30.00																													

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight (gm/cc)	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength,
15.0-16.0	2.78	0.40	2.79	280.00	14.00
16.0-17.0	2.82	0.20	2.84	286.00	14.00
17.0-18.0	2.78	0.20	2.83	271.00	10.00
19.0-20.0	2.84	0.70	2.81	275.00	13.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Notation		
DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Location: SH51,Kombodinjamakkal

Chainage 232+955

Bore Hole No: GT 59

R.L. of BH (m) 25.600

Termination Depth of Borehole : 8.00m

Date of starting:9.11.19

Date of completion:10.11.19

Period of Lab.Test :23.02.20 to 13.3.20

Static Ground Water Table:+24.60m

Method of boring : Rotary Mud Circulation, Rotary Drilling

Type of bit used:TC/Diamond

Co -ordinate 10°18'19"N 76°17'19"E

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00							▨		0.00	25.60																			
0.50																													
1.00								Top surface followed by reddish brown laterite.	to	to																			
1.50	DS	1.50-1.45	1.50	6,7,100 blows for 6cm							SM	10	75	←15→		9.0	2.00		2.70	Non Plastic					0.00	32.0	-		
2.00																	(Suggested)									(Suggested)			
2.50									3.00	22.60																			
3.00	CS	3.0-4.5	3.00	7,Refus	99.0	79.3	v v		3.00	22.60	Metamorphic Rock																		
3.50							v v																						
4.00							v v																						
4.50	CS	4.50-6.0			95.3	92.0	v v																						
5.00							v v	Slightly weathered to fresh ,dark grey,fine grained,moderately strong & hard Quartzite Gneiss.																					
5.50							v v																						
6.00	CS	6.0-7.0			90.0	75.0	v v		to	to																			
6.50							v v																						
7.00	CS	7.0-8.0			100	96.0	v v																						
7.50							v v v																						
8.00							v v		8.00	17.60																			
8.50																													
9.00																													
9.50																													
10.00																													
10.50																													
11.00																													
11.50																													
12.00																													
12.50																													
13.00																													
13.50																													
14.00																													
14.50																													
15.00																													

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight (gm/cc)	Water Absorption (%)	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
3.0-4.5	2.85	0.30	2.86	250.00	14.00
4.50-6.0	2.86	0.90	2.84	251.00	14.00
7.0-8.0	2.72	0.90	2.75	250.00	10.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Vezhakkattukara-Village Rd
Chainage 238+245
Bore Hole No: GT 60
R.L. of BH (m): 15.200
Termination Depth of Borehole : 21.50m

Date of starting:10.10.19
Date of completion:10.10.19
Period Of Lab.test :22.01.20 to 29.01.20

Static Ground Water Table:+6.90m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°20'32.9"N 76°15'29.6"E

Notation		
DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e$_0$
0.00							▨	Top surface soil followed by dense ,reddish brown Moorum	0.00	15.2																			
0.50	DS	1.50-1.95	1.50	47					to	to	SM	35	38	← 27 →						Non Plastic									
1.00																													
1.50									2.00	13.20																			
2.00							▨	Too hard ,reddish yellow silty clay with some moorum.	2.00	13.2																			
2.50																													
3.00	DS	3.0-3.45	3.00	58							CI	0	22	57	21					39	22	17							
3.50																													
4.00																													
4.50	DS	4.50-4.95	4.50	49					to	to	CI	0	24	54	22		2.00		2.66	40	20	20	15.0		3.1			-	-
5.00																	(suggested)								(suggested)				
5.50																													
6.00	DS	6.0-6.45	6.00	17							CI	0	18	60	22					39	19	20							
6.50									7.00	8.20																			
7.00								Stiff to very stiff ,brownish / yellowish grey silty clay with some sand and calcareous nodules.	7.00	8.2																			
7.50	DS	7.50-7.95	7.50	13							CI	0	16	60	24					38	18	20							
8.00																													
8.50																													
9.00																													
9.50																													
10.00											CI	0	22	53	25		1.90			42	19	23	17.0		1.00	5.0			
10.50	DS	10.50-10.95	10.50	16													(suggested)								(suggested)				
11.00									to	to																			
11.50																													
12.00																													
12.50																													
13.00																													
13.50	DS	13.50-13.95	13.50	22																									
14.00																													
14.50																													
15.00									16.00	-0.80																			

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Notation		
DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Location: Vezhakkattukara-Village Rd
Chainage 238+245
Bore Hole No: GT 60
R.L. of BH (m): 15.200
Termination Depth of Borehole : 21.50m

Date of starting:10.10.19
Date of completion:10.10.19
Period Of Lab.test :22.01.20 to 29.01.20

Static Ground Water Table:+6.90m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°20'32.9"N 76°15'29.6"E

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
15.50							▨	-do-																					
16.00							▨		16.00	-0.8																			
16.50	DS	16.50-16.95	16.50	42,100,100 blows for 15 cm							SM	0	85	← 15 →						Non Plastic									
17.00																													
17.50																													
18.00																													
18.50								Completely weathered rock converted to very dense residual soil.																					
19.00									to	to																			
19.50	DS	19.50-19.95	19.50	100 blows for 4cm							SM	0	87	← 13 →			2.00			Non Plastic				0.00	35.00				
20.00																	(suggested)							(suggested)					
20.50																													
21.00																													
21.50	DS	21.50-21.91	21.50	100 blows for 6cm							SP	0	96	← 4 →						Non Plastic									
22.00									21.50	-6.30																			
22.50																													
23.00																													
23.50																													
24.00																													
24.50																													
25.00																													
25.50																													
26.00																													
26.50																													
27.00																													
27.50																													
28.00																													
28.50																													
29.00																													
29.50																													
30.00																													

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Mwp mapranam (NearAnandapuram Nellai Rd)
Chainage 243+100
Bore Hole No: GT 61
R.L. of BH (m): 6.700
Termination Depth of Borehole : 18.00m

Date of starting:10.10.19
Date of completion:12.10.19
Period Of Lab.test :22.01.20 to 29.01.20

Static Ground Water Table:+5.20m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°22'58"N 76°14'31"E

Notation

DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e$_0$
0.00							▨	Top surface soil followed by very soft,reddish grey silty clay with some sand.	0.00	6.7																			
0.50																													
1.00									to	to																			
1.50	DS	1.50-1.95	1.50	1							CI	1	12	63	24					39	20	19	14				-		
2.00									2.50	4.20																			
2.50							▨	Loose to very loose,brownish to dark grey ,micaceous silty medium to fine sand.Clay pockets observed at some places.	2.50	4.20																			
3.00	DS	3.0-3.45	3.00	9							SM	0	86	←14→						Non Plastic									
3.50																													
4.00																													
4.50	DS	4.50-4.95	4.50	2							SM	0	62	←38→						Non Plastic									
5.00																													
5.50																													
6.00	DS	6.0-6.45	6.00	11							SM	0	78	←22→			1.80			Non Plastic					0.00	29.0			
6.50																	(suggested)								(suggested)				
7.00																													
7.50	DS	7.50-7.95	7.50	8					to	to	SM	12	48	←40→						Non Plastic									
8.00																													
8.50																													
9.00																													
9.50																													
10.00																													
10.50	DS	10.50-10.95	10.50	1							SC	0	55	36	9					32	22	10							
11.00																													
11.50																													
12.00																													
12.50									13.00	-6.30																			
13.00	CS	13.0-14.0	13.00	Refusal	78.00	62.00	v v	Slightly weathered to fresh,dark grey,fine grained,,moderately strong & hard Hornblende biotite	13.00	-6.3	Metamorphic Rock																		
13.50							v v																						
14.00	CS	14.0-15.0			98.00	89.00	v v		to	to																			
14.50							v v																						
15.00	CS	15.0-16.0			83.00	74.20	v v		18.00	-11.3																			

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
13.0-14.0	2.78	0.30	2.77	265.00	11.04

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Mwp mapranam (NearAnandapuram Nellai Rd)
Chainage 243+100
Bore Hole No: GT 61
R.L. of BH (m): 6.700
Termination Depth of Borehole : 18.00m

Date of starting:10.10.19
Date of completion:12.10.19
Period Of Lab.test :22.01.20 to 29.01.20

Static Ground Water Table:+5.20m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°22'58"N 76°14'31"E

Notation
DS :Disturbed Sample
UDS :Undisturbed sample
SL :Slipped
TS :Triaxial test(UU)
W.A. :Water absorption
CS:Rock core sample
RQD:Rock Quality Designation
CR:Core Recovery
DT : Direct Shear test
Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
15.50							v v																						
16.00	CS	16.0-17.0			89.00	84.00	v v				Metamorphic Rock																		
16.50							v v	-do-																					
17.00	CS	17.0-18.0			75.20	72.20	v v																						
17.50							v v																						
18.00							v v																						
18.50																													
19.00																													
19.50																													
20.00																													
20.50																													
21.00																													
21.50																													
22.00																													
22.50																													
23.00																													
23.50																													
24.00																													
24.50																													
25.00																													
25.50																													
26.00																													
26.50																													
27.00																													
27.50																													
28.00																													
28.50																													
29.00																													
29.50																													
30.00																													

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
14.0-15.0	2.75	0.30	2.75	278.00	13.00
16.0-17.0	2.79	0.80	2.74	286.00	14.00
17.0-18.0	2.68	0.90	2.71	262.00	11.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Approach of Karuvannur River(Near Paradise Rd)

Chainage 246+290

Bore Hole No: GT 62

R.L. of BH (m): 4.200

Termination Depth of Borehole : 17.15m

Date of starting:11.10.19

Date of completion:16.10.19

Period Of Lab.test :22.01.20 to 29.01.20

Static Ground Water Table:(-)1.10m

Method of boring : Rotary Mud Circulation, Rotary Drilling

Type of bit used:TC/Diamond

Co -ordinate 10°24'17.9"N 76°13'24.7"E

Notation			
DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00							▨	Top surface soil followed by very stiff ,reddish brown Moorum	0.00	4.2																			
0.50									to	to																			
1.00																													
1.50	DS	1.50-1.95	1.50	17					2.00	2.20	SC	20	40	29	11					29	21	8					-		
2.00							▨	Stiff ,reddish yellow silty clay with some moorum.	2.00	2.2																			
2.50																													
3.00	DS	3.0-3.45	3.00	11							CI	0	23	52	25					39	19	20							
3.50									to	to																			
4.00																													
4.50	DS	4.50-4.95	4.50	8							CI	5	29	45	21		1.84		2.66	42	22	20	17		0.50	8.0		0.20	
5.00																	(Suggested)									(Suggested)			
5.50									6.00	-1.80																			
6.00	UDS (UDS	6.00					▨	Medium ,brownish yellow , silty medium to fine sand.Clay pockets observed at some places.	6.00	-1.8																			
6.50	(Unable to collected UDS due to non cohesive sand)																												
7.00																													
7.50	DS	7.50-7.95	7.50	17					to	to	SM	0	72	← 28 →			1.88		2.68	Non Plastic					0.00	32.0			
8.00																	(Suggested)								(Suggested)				
8.50																													
9.00																													
9.50									10.15	-5.95																			
10.00	CS	10.15-11.15	10.15	Refusal	65.00	25.00	v v	Moderately weathered,brownish grey,fine grained, moderately strong & hard Quartzite Gneiss.Inclined joint observed from 10.15m to 11.15m depth.	10.15	-5.95	Metamorphic Rock																		
10.50							v v																						
11.00	CS	11.15-12.15			73.00	39.00	v v																						
11.50							v v																						
12.00	CS	12.15-13.15			70.00	68.00	v v																						
12.50							v v		to	to																			
13.00	CS	13.15-14.15			80.00	52.00	v v																						
13.50							v v																						
14.00	CS	14.15-15.15			80.00	60.00	v v																						
14.50							v v																						
15.00	CS	15.15-16.15			76.00	65.00	v v		17.15	-13.0																			

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
10.15-11.15	2.65	1.10	2.68	245.00	13.00
11.15-12.15	2.69	0.60	2.69	241.00	11.00
12.15-13.15	2.72	0.60	2.73	266.00	13.00
15.15-16.15	2.79	0.20	2.78	282.00	14.00
16.15-17.15	2.79	0.20	2.76	280.00	13.00

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Approach of Karuvannur River(Near Paradise Rd)
Chainage 246+290
Bore Hole No: GT 62
R.L. of BH (m): 4.200
Termination Depth of Borehole : 17.15m

Date of starting:11.10.19
Date of completion:16.10.19
Period Of Lab.test :22.01.20 to 29.01.20

Static Ground Water Table:(-)1.10m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°24'17.9"N 76°13'24.7"E

Notation

DS :Disturbed Sample	CS:Rock core sample
UDS :Undisturbed sample	RQD:Rock Quality Designation
SL :Slipped	CR:Core Recovery
TS :Triaxial test(UU)	DT : Direct Shear test
W.A. :Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
15.50							v v	-do-			Metamorphic Rock																		
16.00	CS	16.15-17.15			98.00	91.00	v v																						
16.50							v v																						
17.00							v v																						
17.50																													
18.00																													
18.50																													
19.00																													
19.50																													
20.00																													
20.50																													
21.00																													
21.50																													
22.00																													
22.50																													
23.00																													
23.50																													
24.00																													
24.50																													
25.00																													
25.50																													
26.00																													
26.50																													
27.00																													
27.50																													
28.00																													
28.50																													
29.00																													
29.50																													
30.00																													

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Near Pig Farm T.L.P.C
Chainage 248+710
Bore Hole No: GT 63
R.L. of BH (m): 6.200
Termination Depth of Borehole : 17.60m

Date of starting:12.10.19
Date of completion:14.10.19
Period Of Lab.test :22.01.20 to 29.01.20

Static Ground Water Table:+5.70m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°25'12.3"N 76°12'26.0"E

Notation

DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristi	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm²)	Φ (degree)	UCC (kg/cm²)	Cc	e₀
0.00								Top surface soil followed by very soft,blackish grey silty clay with some decomposed organic matter.Some fine sand observed intermittently.	0.00	6.2																			
0.50																													
1.00																													
1.50	DS	1.50-1.95	1.50	2							OL	1	13	61	25					34	22	12					-		
2.00																													
2.50																													
3.00	DS	3.0-3.45	3.00	1							OL	0	13	72	15		1.75		2.56	34	30	4	9		0.1	0.0			
3.50									to	to							(Suggested)								(Suggested)				
4.00																													
4.50	DS	4.50-4.95	4.50	1																									
5.00																													
5.50																													
6.00	DS	6.0-6.45	6.00	0							OL	0	9	69	22					33	30	3							
6.50																													
7.00									7.50	-1.30																			
7.50	DS	7.50-7.95	7.50	11				Medium to loose,brownish yellow , silty medium to fine sand.Clay pockets observed at some places.Little angular gravels obseved scatterdly.	7.50	-1.30	SM	5	75	← 20 →			1.82		2.68	Non Plastic					0.00	30.0			
8.00																	(Suggested)								(Suggested)				
8.50																													
9.00																													
9.50																													
10.00									to	to																			
10.50	DS	10.50-10.95	10.50	9							SM	0	68	← 32 →			1.80			Non Plastic					0.00	28.0			
11.00																	(Suggested)								(Suggested)				
11.50																													
12.00									12.50	-6.30																			
12.50	CS	12.50-13.60	12.50	Refusal	88.00	75.00	v v	Slightly weathered to fresh,dark grey,fine grained, moderately strong & hard Quartzite Gneiss.	12.50	-6.30	Metamorphic Rock																		
13.00							v v																						
13.50	CS	13.60-14.60			92.00	54.00	v v																						
14.00							v v		to	to																			
14.50	CS	14.60-15.60			87.00	69.00	v v																						
15.00							v v		17.60	-11.4																			

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm²)	Point Load strength, kg/cm²
12.60-13.60	2.80	0.30	2.78	285.00	15.00
13.60-14.60	2.71	0.80	2.75	269.00	10.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location:	Near Pig Farm T.L.P.C			
Chainage	248+710	Date of starting:12.10.19	Static Ground Water Table:+5.70m	
Bore Hole No:	GT 63	Date of completion:14.10.19	Method of boring : Rotary Mud Circulation, Rotary Drilling	
R.L. of BH (m):	6.200	Period Of Lab.test :22.01.20 to 29.01.20	Type of bit used:TC/Diamond	
Termination Depth of Borehole : 17.60m			Co -ordinate	10°25'12.3"N 76°12'26.0"E

Notation

DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristi	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e$_0$
15.50	CS	15.60-16.60			79.00	54.00	v v				Metamorphic Rock																		
16.00							v v																						
16.50	CS	16.60-17.60			92.00	82.00	v v	-do-																					
17.00							v v																						
17.50							v v																						
18.00																													
18.50																													
19.00																													
19.50																													
20.00																													
20.50																													
21.00																													
21.50																													
22.00																													
22.50																													
23.00																													
23.50																													
24.00																													
24.50																													
25.00																													
25.50																													
26.00																													
26.50																													
27.00																													
27.50																													
28.00																													
28.50																													
29.00																													
29.50																													
30.00																													

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
14.60-16.60	2.71	0.80	2.74	278.00	13.00
16.60-17.60	2.75	0.50	2.74	266.00	10.00

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Chevoor - Pootharakkal Bypass Rd, Pootharakkal
Chainage 253+890
Bore Hole No: GT 64
R.L. of BH (m): 3.300
Termination Depth of Borehole : 12.00m
Date of completion:16.10.19
Period Of Lab.test :22.01.20 to 29.01.20
Static Ground Water Table:+2.80m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°27'52.2"N 76°12'27.6"E

Notation
DS :Disturbed Sample
UDS :Undisturbed sample
SL :Slipped
TS :Triaxial test(UU)
W.A. :Water absorption
CS:Rock core sample
RQD:Rock Quality Designation
CR:Core Recovery
DT : Direct Shear test
Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT Depth (m)	SPT Observed"N" Value	Rock Sample CR (%)	Rock Sample RQD (%)	Log Symbol	Description of Strata	Strata Depth (m) From / To	Strata Depth (m) RL	IS classification	Grain Size Distribution % Gravel	% Sand	% Silt	% clay	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits LL (%)	PL (%)	PI(%)	Ws (%)	Shearing Strength characteristic Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Consolidation Characteristic Cc	e_0
0.00							▨	Top surface soil followed by medium stiff ,yellowish grey silty clay with some fine sand and rounded gravels.	0.00	3.3																			
0.50							▨																						
1.00							▨																						
1.50	DS	1.50-1.95	1.50	5			▨				CI	2	7	63	28		1.82			40	20	20	12		0.31	2.0	-		
2.00							▨										(Suggested)								(Suggested)				
2.50							▨																						
3.00	DS	3.0-3.45	3.00	5			▨		to	to																			
3.50							▨																						
4.00							▨																						
4.50	DS	4.50-4.95	4.50	3			▨				CI	10	20	45	25		1.78			39	20	19	19		0.19	2.0			
5.00							▨										(Suggested)								(Suggested)				
5.50							▨																						
6.00	DS	6.0-6.45	6.00	7			▨																						
6.50							▨		7.00	-3.70																			
7.00	CS	7.0-8.0	7.00	Refusal	95.00	95.00	v v	Slightly weathered to fresh,dark grey,fine grained,moderately strong & hard Hornblende biotite Gneiss.	7.00	-3.7	Metamorphic Rock																		
7.50							v v																						
8.00	CS	8.0-9.0			90.00	80.00	v v																						
8.50							v v																						
9.00	CS	9.0-10.0			88.00	88.00	v v																						
9.50							v v		to	to																			
10.00	CS	10.0-11.0			80.00	80.00	v v																						
10.50							v v																						
11.00	CS	11.0-12.0			96.00	96.00	v v																						
11.50							v v																						
12.00							v v		12.00	-8.70																			
12.50																													
13.00																													
13.50																													
14.00																													
14.50																													
15.00																													

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
7.0-8.0	2.78	0.80	2.79	289.00	15.00
8.0-9.0	2.83	1.00	2.81	270.00	14.00
9.0-10.0	2.88	0.30	2.90	296.00	14.00
10.0-11.0	2.83	0.60	2.82	266.00	10.00
11.0-12.0	2.85	0.30	2.81	285.00	15.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Palakkal-Approach of Canal
Chainage 255+457
Bore Hole No: GT 65
R.L. of BH (m): 3.700
Termination Depth of Borehole : 14.90m

Date of starting:16.10.19
Date of completion:18.10.19
Period Of Lab.test :22.01.20 to 29.01.20

Static Ground Water Table:+1.60m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°28'41.3"N 76°12'41.8"E

Notation

DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT Depth (m)	SPT Observed"N" Value	Rock Sample CR (%)	Rock Sample RQD (%)	Log Symbol	Description of Strata	Strata Depth (m) From / To	Strata Depth (m) RL	IS classification	Grain Size Distribution % Gravel	% Sand	% Silt	% clay	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits LL (%)	PL (%)	PI(%)	Ws (%)	Shearing Strength characteristic Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Consolidation Characterist Cc	e_0
0.00								Top surface soil followed by very stiff ,reddish brown Moorum.Grey lamination observed.	0.00	3.7																			
0.50																													
1.00																													
1.50	DS	1.50-1.95	1.50	16							SC	15	60	14	11		1.92 (Suggested)			32	20	12	22		0.40 (Suggested)	23.0	-		
2.00									to	to																			
2.50																													
3.00	DS	3.0-3.45	3.00	15																									
3.50																													
4.00																													
4.50	DS	4.50-4.95	4.50	26					5.00	-1.30	SC	7	53	29	11					32	19	13							
5.00								Stiff ,brownish / yellowish grey silty clay with some sand and calcareous nodules.	5.00	-1.30																			
5.50																													
6.00	DS	6.0-6.45	6.00	12							CI	10	18	49	23		1.86 (Suggested)		2.63	39	21	18	16		0.70 (Suggested)	7.0			
6.50																													
7.00									to	to																			
7.50	DS	7.50-7.95	7.50	7							CI	12	15	47	26					38	22	16							
8.00																													
8.50																													
9.00									9.90	-6.20																			
9.50	CS	9.90-10.90	9.90	Refusal	100.00	91.00	v v	Slightly weathered to fresh,dark grey,fine grained,moderately strong & hard Biotite Schist.	9.90	-6.20	Metamorphic Rock																		
10.00							v v																						
10.50							v v																						
11.00	CS	10.90-11.90			90.00	90.00	v v																						
11.50							v v																						
12.00	CS	11.90-12.90			100.00	100.00	v v		to	to																			
12.50							v v																						
13.00	CS	12.90-13.90			88.00	74.00	v v																						
13.50							v v																						
14.00	CS	13.90-14.90			73.00	68.00	v v																						
14.50							v v																						
15.00							v v		14.90	-11.2																			

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
9.90-10.90	2.90	0.60	2.85	322.00	13.42
10.90-11.90	2.88	0.50	2.89	278.00	11.58
11.90-12.90	2.90	0.20	2.91	296.00	12.33
12.90-13.90	2.82	0.90	2.86	271.00	11.29
13.90-14.90	2.86	1.10	2.85	272.00	11.33

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Thrissur railway station
Chainage 259+557
Bore Hole No: GT 66
R.L. of BH (m): 12.100
Termination Depth of Borehole : 17.00m

Date of starting:22.10.19
Date of completion:23.10.19
Period Of Lab.test :22.01.20 to 29.01.20

Static Ground Water Table:Not met
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°30'45.1"N 76°12'23.7"E

Notation

DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristi	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00							▨		0.00	12.1																			
0.50							▨																						
1.00							▨																						
1.50	Sludge	1.50					▨																				-		
2.00							▨																						
2.50							▨																						
3.00	Sludge	3.0-3.45	3.00	55			▨																						
3.50							▨																						
4.00							▨																						
4.50	Sludge	4.50-4.95	4.50	3			▨	Filled up ground with moorum,decomposed organic soil etc.	to	to	Fill																		
5.00							▨																						
5.50							▨																						
6.00	Sludge	6.0-6.45	6.00	1			▨																						
6.50							▨																						
7.00							▨																						
7.50	Sludge	7.50-7.95	7.50	11			▨																						
8.00							▨																						
8.50							▨																						
9.00							▨		10.50	1.60																			
10.50	DS	10.50-10.95	10.50	Refusal			▦		10.50	1.60																			
11.00	DS	11.0-12.0	11.00	>100	0.00	0.00	▦				SM	11	61	← 28 →			2.00		2.68			Non Plastic			0.00	34.0			
10.50							▦										(Suggested)								(Suggested)				
12.00	DS	12.0-13.0	12.00	>100	0.00	0.00	▦																						
11.50							▦																						
13.00	DS	13.0-14.0	13.00	>100	0.00	0.00	▦	Completely weathered rock converted to very dense residual soil with some fragmented rock	to	to	SM	9	62	← 29 →								Non Plastic							
12.50							▦																						
14.00	DS	14.0-15.0	14.00	>100	0.00	0.00	▦																						
13.50							▦																						
15.00	DS	15.0-16.0	15.00	>100	0.00	0.00	▦				SM	15	52	← 33 →								Non Plastic							
14.50							▦																						
16.00	DS	16.0-17.0	16.00	>100	0.00	0.00	▦		17.00	-4.90																			

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Mundur Kottekkad Rd
Chainage 266+890
Bore Hole No: GT 67
R.L. of BH (m): 10.600
Termination Depth of Borehole : 12.40m

Date of starting:17.10.19
Date of completion:18.10.19
Period Of Lab.test :22.01.20 to 29.01.20

Static Ground Water Table:+3.80m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°34'22.96"N 76°11'28.74"E

Notation

DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e$_0$
0.00							▩	Top surface soil followed by hard ,reddish brown Moorum	0.00	10.6																			
0.50							▩																						
1.00							▩		to	to																			
1.50	DS	1.50-1.95	1.50	43			▩				SC	26	32	32	10					32	19	13	25				-		
2.00							▩		2.50	8.10																			
2.50							▒	Very stiff to stiff ,brownish / yellowish with bluish patches silty clay with some sand and calcareous nodules.	2.50	8.10																			
3.00	DS	3.0-3.45	3.00	19			▒				CI	5	28	41	26		1.92		2.64	39	21	18	16		1.20	6.0			
3.50							▒										(Suggested)								(Suggested)				
4.00							▒																						
4.50	DS	4.50-4.95	4.50	16			▒		to	to																			
5.00							▒																						
5.50							▒																						
6.00	DS	6.0-6.45	6.00	7			▒				CI	5	15	52	28		1.85		2.68	41	20	21			0.40	5.0			
6.50							▒										(Suggested)								(Suggested)				
7.00							▒		7.50	3.10																			
7.50	CS	7.40-8.40	7.50	Refusal	82.00	82.00	v v	Slightly weathered to fresh,dark grey,fine grained,moderately strong & hard Biotite Schist.	7.50	3.10	Metamorphic Rock																		
8.00							v v																						
8.50	CS	8.40-9.40			60.00	60.00	v v																						
9.00							v v																						
9.50	CS	9.40-10.40			85.00	85.00	v v																						
10.00							v v		to	to																			
10.50	CS	10.40-11.40			70.00	70.00	v v																						
11.00							v v																						
11.50	CS	11.40-12.40			80.00	55.00	v v																						
12.00							v v																						
12.50							v v		12.40	-1.80																			
13.00																													
13.50																													
14.00																													
14.50																													
15.00																													

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
7.40-8.40	2.82	0.50	2.83	289.00	15.00
8.40-9.40	2.85	0.80	2.89	291.00	11.00
9.40-10.40	2.82	0.20	2.85	289.00	14.00
10.40-11.40	2.82	0.30	2.81	265.00	10.00
11.40-12.40	2.82	0.30	2.82	270.00	12.00

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Arampilly Road,
Chainage 273+200
Bore Hole No: GT 68
R.L. of BH (m): 15.000
Termination Depth of Borehole : 9.50m

Date of starting:20.10.19
Date of completion:21.10.19
Period Of Lab.test :22.01.20 to 29.01.20

Static Ground Water Table:Not met
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°36'38.7"N 76°08'54.6"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00								Top surface soil followed by stiff ,reddish brown Moorum	0.00 to 2.00	15.0 to 13.00																			
0.50																													
1.00																													
1.50	DS	1.50-1.95	1.50	16							SM	12	44	← 44 →			1.90		2.69	Non Plastic					0.00	31.0	-		
2.00								Completely weathered rock converted to dense residual soil.	2.00 to 4.50	13.0 to 10.50							(Suggested)								(Suggested)				
2.50																													
3.00	DS	3.0-3.45	3.00	32							SM	0	65	← 35 →			1.95		2.64	Non Plastic					0.00	33.0			
3.50																	(Suggested)								(Suggested)				
4.00																													
4.50	CS	4.50-5.50	4.50	Refusal	97.00	74.00	v v v	Slightly weathered to fresh,dark grey,fine grained,moderately strong & hard Hornblende biotite Gneiss.	4.50 to 9.50	10.50 to 5.50	Metamorphic Rock																		
5.00							v v v																						
5.50	CS	5.50-6.50			100.00	67.00	v v v																						
6.00							v v v																						
6.50	CS	6.50-7.50			91.00	82.00	v v v																						
7.00							v v v																						
7.50	CS	7.50-8.50			90.00	83.00	v v v																						
8.00							v v v																						
8.50	CS	8.50-9.50			80.00	80.00	v v v																						
9.00							v v v																						
9.50							v v v																						
10.00																													
10.50																													
11.00																													
11.50																													
12.00																													
12.50																													
13.00																													
13.50																													
14.00																													
14.50																													
15.00																													

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight (gm/cc)	Water Absorption (%)	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
4.50-5.50	2.80	0.50	2.81	292.00	16.00
5.50-6.50	2.74	0.50	2.78	281.00	12.00
6.50-7.50	2.83	0.80	2.82	289.00	14.00
7.50-8.50	2.85	0.60	2.84	265.00	10.00
8.50-9.50	2.83	0.80	2.81	274.00	14.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Notation			
DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Location: Approach of Aloor River
Chainage 277+885
Bore Hole No: GT 69A
R.L. of BH (m): 15.000
Termination Depth of Borehole : 15.20m

Date of starting:24.10.19
Date of completion:25.10.19
Period Of Lab.test :22.01.20 to 29.01.20

Static Ground Water Table:+13.20m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°37'59.70"N 76° 6'45.20"E

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00							▨	Top surface soil followed by medium stiff ,reddish with bluish patches silty clay. Some fine sand and rounded gravels observed.	0.00	15.0																			
0.50																													
1.00																													
1.50	DS	1.50-1.95	1.50	5					to	to	CI	6	24	51	19		1.82		2.65	39	22	17	18		0.25	6.0	-		
2.00																	(Suggested)								(Suggested)				
2.50																													
3.00	DS	3.0-3.45	3.00	7																									
3.50									4.00	11.00																			
4.00							▩	Stiff to very stiff,reddish with brownish laminated clayey medium to fine sand.Traces of calcite observed.	4.00	11.00																			
4.50	DS	4.50-4.95	4.50	13							SC	4	52	34	10					33	22	11							
5.00									to	to																			
5.50																													
6.00	DS	6.0-6.45	6.00	18							SC	3	57	29	11		1.93		2.67	33	20	13			0.40	18.0			
6.50									7.00	8.00							(Suggested)								(Suggested)				
7.00							▩	Completely weathered rock converted to dense residual soil.	7.00	8.00																			
7.50	DS	7.50-7.95	7.50	45							SM	10	76	← 14 →			2.00		2.64	Non Plastic					0.00	32.0			
8.00									to	to							(Suggested)								(Suggested)				
8.50																													
9.00																													
9.50									10.20	4.80																			
10.00	CS	10.20-11.20	10.20	Refusal	82.00	74.00	v v	Moderately fresh,brownish grey,fine grained, moderately strong & hard Quartzite Gneiss.Inclined joint observed from 11.20m to 12.20m depth.	10.20	4.80	Metamorphic Rock																		
10.50							v v																						
11.00	CS	11.20-12.20			80.00	65.00	v v																						
11.50							v v																						
12.00	CS	12.20-13.20			97.00	69.00	v v																						
12.50							v v		to	to																			
13.00	CS	13.20-14.20			83.00	83.00	v v																						
13.50							v v																						
14.00	CS	14.20-15.20			80.00	70.00	v v																						
14.50							v v																						
15.00							v v		15.20	-0.20																			

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight (gm/cc)	Water Absorption (%)	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
10.20-11.20	2.78	1.20	2.75	255.00	13.00
11.20-12.20	2.74	1.00	2.71	246.00	9.00
12.20-13.20	2.82	0.50	2.79	266.00	13.00
13.20-14.20	2.78	0.60	2.75	277.00	14.00
14.20-15.20	2.81	0.20	2.85	291.00	16.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Chowwannur part
Chainage 283+013
Bore Hole No: GT 70
R.L. of BH (m): 5.200
Termination Depth of Borehole : 14.00m

Date of starting:22.10.19
Date of completion:25.10.19
Period Of Lab.test :22.01.20 to 29.01.20

Static Ground Water Table:+4.95m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°39'57.23"N 76° 4'46.76"E

Notation

DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e$_0$
0.00							▩	Laterite.	0.00	5.2	Lateritic boulder																		
0.50																													
1.00									to	to																			
1.50	DS	1.50-1.95	1.50	10																							-		
2.00																													
2.50									3.00	2.20																			
3.00	DS	3.0-3.45	3.00	7			▒	Medium to stiff ,reddish with bluish patches silty clay. Some fine sand and rounded gravels observed.	3.00	2.2	CI	4	22	53	21		1.82			39	22	17			0.28	6.0			
3.50																	(Suggested)								(Suggested)				
4.00																													
4.50	DS	4.50-4.95	4.50	5					to	to	CI	0	16	61	23				2.68	38	22	16	17						
5.00																													
5.50																													
6.00	DS	6.0-6.45	6.00	11							CL	0	32	48	20					34	22	12							
6.50									7.00	-1.80																			
7.00							░	Completely weathered rock converted to very dense residual soil.	7.00	-1.8																			
7.50	DS	7.50-7.95	7.50	100					to	to	SM	0	84	←16→			2.00		2.67	Non Plastic					0.00	36.0			
									8.00	-2.80							(Suggested)								(Suggested)				
8.00	CS	8.0-9.0	8.00	Refusal	68.00	10.00	v v v	Moderately fresh,brownish grey,fine grained, moderately strong & hard Quartzite Gneiss.Vertical joint observed from 8.0m to 9.0m depth	8.00	-2.8	Metamorphic Rock																		
8.50							v v v																						
9.00	CS	9.0-10.0			69.00	51.00	v v v																						
9.50							v v v																						
10.00	CS	10.0-11.0			79.00	60.00	v v v																						
10.50							v v v																						
11.00	CS	11.0-12.0			94.00	85.00	v v v		to	to																			
11.50							v v v																						
12.00	CS	12.0-13.0			98.00	67.00	v v v																						
12.50							v v v																						
13.00	CS	13.0-14.0			65.00	50.00	v v v																						
13.50							v v v																						
14.00							v v v		14.00	-8.80																			
14.50																													
15.00																													

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
8.0-9.0	2.61	1.50	2.62	156.00	7.00
9.0-10.0	2.66	0.90	2.68	225.00	8.00
10.0-11.0	2.80	0.30	2.82	302.00	15.00
11.0-12.0	2.85	0.30	2.88	281.00	13.00
12.0-13.0	2.88	0.20	2.89	325.00	17.00
13.0-14.0	2.72	0.90	2.71	256.00	10.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Near Pazhanji - Pavittapuram Rd,Aynoor-Approach of stream
Chainage 288+647
Bore Hole No: GT 71
R.L. of BH (m): 14.400
Termination Depth of Borehole : 17.20m

Date of starting:24.10.19
Date of completion:24.10.19
Period of Lab.Test :04.2.20 to 12.2.20

Static Ground Water Table:+13.90m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°42'32.39"N 76° 3'10.00"E

Notation

DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00								Greyish brown,completely weathered rock converted to residual soil.	0.00	14.40																			
0.50																													
1.00									to	to	ML	21	23	56	0					Non Plastic									
1.50	DS	1.50-1.95	1.50	14																							-		
2.00									2.50	11.90																			
2.50								Very soft /medium stiff,brownish grey silty clay with some sand.Decomposed organic matter observed intermittently.	2.50	11.90																			
3.00	DS	3.0-3.45	3.00	10							CI	6	18	53	23	25.0	1.85	1.48	2.67	39	22	17	19		0.40	4.0		0.26	0.80
3.50																	(Suggested)										(Suggested)		
4.00																													
4.50	DS	4.50-4.95	4.50	3							CI	1	12	66	21					40	20	20							
5.00																													
5.50																													
6.00	DS	6.0-6.45	6.00	1							OL	0	2	82	16		1.60			33	30	3			0.10	0.0			
6.50									to	to							(Suggested)									(Suggested)			
7.00																													
7.50	DS	7.50-7.95	7.50	2							CI	0	4	71	25					39	21	18							
8.00																													
8.50																													
9.00																													
9.50																													
10.00																													
10.50	DS	10.50-10.95	10.50	20					11.20	3.20																			
11.00	CS	11.20-12.20	11.20	Refusal	48.00	41.0	v v	Slightly weathered to fresh,dark grey,fine grained, moderately strong & hard Quartzite Gneiss.	11.20	3.20	Metamorphic Rock																		
11.50							v v																						
12.00	CS	12.20-13.20			99.00	99.0	v v																						
12.50							v v																						
13.00	CS	13.20-14.20			88.00	78.0	v v		to	to																			
13.50							v v																						
14.00	CS	14.20-15.20			81.00	59.0	v v																						
14.50	CS	15.20-16.20			39.00	32.0	v v																						
15.00	CS	16.20-17.20	Barrel not recovered				v v		17.20	-2.80																			

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
12.20-13.20	2.82	0.50	2.78	269.00	10.00
14.20-15.20	2.75	0.90	2.70	255.00	13.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Village Rd-Alamcode
Chainage 294+215
Bore Hole No: GT 72
R.L. of BH (m): 6.900
Termination Depth of Borehole : 23.00m

Date of starting:26.10.19
Date of completion:01.11.19
Period of Lab.Test :04.2.20 to 12.2.20

Static Ground Water Table:+5.90m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°45'06.7"N 76° 01'36.0"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00							▨	Top surface soil followed by too hard Reddish brown Moorum.	0.00	6.90																			
0.50																													
1.00									to	to																			
1.50	DS	1.50-1.95	1.50	50							SC	23	40	29	8					30	21	9					-		
2.00																													
2.50									3.00	3.90																			
3.00	DS	3.0-3.45	3.00	14			▨	Stiff to very stiff,brownish yellow silty clay with some and calcareous nodules.	3.00	3.90	CI	5	22	45	28	27.0	1.95	1.54	2.65	40	22	18	18		0.60	4.0		0.18	0.73
3.50																	(Suggested)									(Suggested)			
4.00																													
4.50	DS	4.50-4.95	4.50	12																									
5.00																													
5.50																													
6.00	DS	6.0-6.45	6.00	5							CI	8	22	45	25		1.80			39	21	18	17		0.20	5.0			
6.50																	(Suggested)								(Suggested)				
7.00																													
7.50	DS	7.50-7.95	7.50	28																									
8.00																													
8.50																													
9.00									to	to																			
9.50																													
10.00																													
10.50	DS	10.50-10.95	10.50	25							CI	0	19	54	27		1.90			41	21	20	17		1.00	4.00			
11.00																	(Suggested)								(Suggested)				
11.50																													
12.00																													
12.50																													
13.00																													
13.50	DS	13.50-13.95	13.50	25																									
14.00																													
14.50																													
15.00									15.50	-8.60																			

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location:	Village Rd-Alamcode		
Chainage	294+215	Date of starting:26.10.19	Static Ground Water Table:+5.90m
Bore Hole No:	GT 72	Date of completion:01.11.19	Method of boring : Rotary Mud Circulation, Rotary Drilling
R.L. of BH (m):	6.900	Period of Lab.Test :04.2.20 to 12.2.20	Type of bit used:TC/Diamond
Termination Depth of Borehole : 23.00m			Co -ordinate 10°45'06.7"N 76° 01'36.0"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e$_0$
15.50							▨	Completely weathered rock converted to greyish brown very stiff residual soil.	15.50	-8.60																			
16.00																													
16.50	DS	16.50-16.95	16.50	22					to	to	SC	0	56	38	6					30	22	8							
17.00																													
17.50									18.00	-11.10																			
18.00	CS	18.0-19.0	18.00	Refusal	97.00	65.00	v v v	Moderately fresh,brownish grey,fine grained, moderately strong & hard Quartzite Gneiss.Vertical joint observed from 19.0m to 20.0m depth	18.00	-11.10	Metamorphic Rock																		
18.50							v v v																						
19.00	CS	19.0-20.0			86.00	47.00	v v v																						
19.50							v v v																						
20.00	CS	20.0-21.0			87.00	68.00	v v v																						
20.50							v v v		to	to																			
21.00	CS	21.00-22.0			86.00	53.00	v v v																						
21.50							v v v																						
22.00	CS	22.0-23.0			82.00	32.00	v v v																						
22.50							v v v																						
23.00							v v v		23.00	-16.10																			
23.50																													
24.00																													
24.50																													
25.00																													
25.50																													
26.00																													
26.50																													
27.00																													
27.50																													
28.00																													
28.50																													
29.00																													
29.50																													
30.00																													

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength,
18.0-19.0	2.77	0.30	2.68	256.00	13.00
20.0-21.0	2.82	0.50	2.79	269.00	13.00
22.0-23.0	2.69	1.30	2.65	198.00	7.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Near Naas Rd,Edappal
Chainage 298+048
Bore Hole No: GT 73
R.L. of BH (m): 2.500
Termination Depth of Borehole : 13.10m

Date of starting:27.10.19
Date of completion:28.10.19
Period of Lab.Test :04.2.20 to 12.2.20

Static Ground Water Table:(-)3.70m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°47'06.1"N 76°00'59.9"E

Notation			
DS	:Disturbed Sample	CS:	Rock core sample
UDS	:Undisturbed sample	RQD:	Rock Quality Designation
SL	:Slipped	CR:	Core Recovery
TS	:Triaxial test(UU)	DT :	Direct Shear test
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00							▨	Top surface soil followed by stiff to too hard reddish brown Moorum.	0.00	2.5																			
0.50																													
1.00																													
1.50	DS	1.50-1.95	1.50	9							SC	30	35	25	10					30	18	12					-		
2.00																													
2.50									to	to																			
3.00	DS	3.0-3.45	3.00	47																									
3.50																													
4.00																													
4.50	DS	4.50-4.95	4.50	40							SC	18	40	33	9	16.0	1.95	1.68	2.69	30	20	10	23		1.30	14.0		0.10	0.60
5.00									5.50	-3.00							(Suggested)										(Suggested)		
5.50							▨	Stiff,reddish brown silty clay with good percentage of medium sand.	5.50	-3.00																			
6.00	DS	6.0-6.45	6.00	10							CI	0	20	52	28		1.90			39	19	20	14		0.50	4.0			
6.50									to	to							(Suggested)									(Suggested)			
7.00																													
7.50	DS	7.50-7.95	7.50	8					8.10	-5.60																			
8.00	CS	8.10-9.10	8.10	Refusal	90.0	90.0	v v	Moderately fresh,dark grey,fine grained, moderately strong & hard Quartzite Gneiss.	8.10	-5.60	Metamorphic Rock																		
8.50							v v																						
9.00	CS	9.10-10.10			82.0	82.0	v v																						
9.50							v v																						
10.00	CS	10.10-11.10			82.0	82.0	v v																						
10.50							v v		to	to																			
11.00	CS	11.10-12.10			85.0	78.0	v v																						
11.50							v v																						
12.00	CS	12.10-13.10			70.0	63.0	v v																						
12.50							v v																						
13.00							v v		13.10	-10.6																			
13.50																													
14.00																													
14.50																													
15.00																													

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
8.10-9.10	2.89	0.30	2.85	285.00	14.00
10.10-11.10	2.84	0.80	2.82	269.00	13.00
12.10-13.10	2.80	0.90	2.78	271.00	13.00

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Village Rd-Maravanchery
Chainage 303+626
Bore Hole No: GT 74
R.L. of BH (m): 24.900
Termination Depth of Borehole : 13.80m

Date of starting:29.10.19
Date of completion:02.11.19
Period of Lab.Test :04.2.20 to 12.2.20

Static Ground Water Table:+17.70m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°49'55.9"N 76°59'55.1"E

Notation

DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00								Top surface soil followed by very dense reddish brown Moorum.	0.00	24.90																			
0.50																													
1.00									to	to																			
1.50	DS	1.50-1.95	1.50	>100							SM	27	60	← 13 →			2.10			Non Plastic					0.00	35.0	-		
2.00																	(Suggested)								(Suggested)				
2.50									3.00	21.90																			
3.00	DS	3.0-3.45	3.00	18				Stiff,reddish brown silty clay with good percentage of medium sand.	3.00	21.90																			
3.50																													
4.00																													
4.50	DS	4.50-4.95	4.50	14							CI	2	16	58	24					38	20	18							
5.00																													
5.50									to	to																			
6.00	DS	6.0-6.45	6.00	13							CI	5	24	52	19	26.0	1.90	1.51	2.67	37	20	17	17		0.50	6.0		0.15	0.77
6.50																	(Suggested)								(Suggested)				
7.00																													
7.50	DS	7.50-7.95	7.50	11							CI	7	24	50	19					38	19	19							
8.00									8.80	16.10																			
8.50	CS	8.80-9.80	8.80	Refusal	73.0	73.0	v v	Slightly weathered to fresh,dark grey,fine grained,moderately strong & hard Hornblende Biotite Gneiss.	8.80	16.10	Metamorphic Rock																		
9.00							v v																						
9.50	CS	9.80-10.80			86.0	86.0	v v																						
10.00							v v																						
10.50	CS	10.80-11.80			75.0	75.0	v v																						
11.00							v v		to	to																			
11.50	CS	11.80-12.80			90.0	90.0	v v																						
12.00							v v																						
12.50	CS	12.80-13.80			58.0	58.0	v v - -																						
13.00							v v																						
13.50							v v		13.80	11.10																			
14.00																													
14.50																													
15.00																													

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
8.80-9.80	2.71	1.00	2.72	255.00	13.00
10.80-11.80	2.78	0.40	2.80	268.00	13.00
12.80-13.80	2.82	0.80	2.78	259.00	9.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location:	Approach Of Bharathapuzha River
Chainage	307+600
Bore Hole No:	GT 75A
R.L. of BH (m):	3.000

Termination Depth of Borehole : 30.40m

Date of starting:2.11.19
Date of completion:6.11.19
Period of Lab.Test :04.2.20 to 12.2.20

Static Ground Water Table:+1.35m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°51'46.46"N 75°58'47.99"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00							▦	Top surface soil followed by medium to stiff,brownish grey silty clay with good percentage to medium to fine sand.	0.00	3.00																			
0.50																													
1.00																													
1.50	DS	1.50									CI	0	11	89													-		
2.00									to	to																			
2.50																													
3.00	DS	3.0-3.45	3.00	16							CL	0	28	72															
3.50																													
4.00	UDS	4.15-4.60									CL	0	35	44	21	25.0	1.94	1.55	2.68	31	19	12	22	TS	0.35	7.0	0.65	0.16	0.73
4.50	DS	4.60-5.05	4.60	10					5.00	-2.00																			
5.00							▤	Very soft dark grey silty clay .Decomposed organic matter observed intermittently.	5.00	-2.00																			
5.50									to	to																			
6.00	DS	6.0-6.45	6.00	2																									
6.50	UDS	6.50-6.95							7.00	-4.00	OI	0	2	77	21	41.0	1.50	1.06	2.59	48	36	12	10	TS	0.14	0.0	0.16	0.35	1.43
7.00							▩	Medium dense,brownish grey silty fine to medium micaceous sand.Clay pockets observed scatterdly.	7.00	-4.00																			
7.50	DS	7.50-7.95	7.50	20							SM	0	86	←14→						Non Plastic									
8.00																													
8.50																													
9.00																													
9.50																													
10.00																													
10.50	DS	10.50-10.95	10.50	12							SM	0	54	←46→			1.75 (Suggested)		2.6	Non Plastic					0.00 (Suggested)	30			
11.00									to	to																			
11.50																													
12.00																													
12.50																													
13.00																													
13.50	DS	13.50-13.95	13.50	10							SM	0	83	←17→						Non Plastic									
14.00	UDS	(UDS slipped due to non cohesive soil)																											
14.50																													
15.00									26.40	-23.40																			

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Approach Of Bharathapuzha River
Chainage 307+600
Bore Hole No: GT 75A
R.L. of BH (m): 3.000
Termination Depth of Borehole : 30.40m

Date of starting:2.11.19
Date of completion:6.11.19
Period of Lab.Test :04.2.20 to 12.2.20

Static Ground Water Table:+1.35m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°51'46.46"N 75°58'47.99"E

Notation

DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
15.50								Medium dense,brownish grey silty fine to medium micaceous sand.Clay pockets observed scatterdly.																					
16.00																													
16.50	DS	16.50-16.95	16.50	14							CL-ML	0	24	66	10				2.62	30	26	4							
17.00																													
17.50																													
18.00																													
18.50																													
19.00																													
19.50	DS	19.50-19.95	19.50	16							SP	0	96	← 4 →			1.76			Non Plastic					0.00	31.0			
20.00																	(Suggested)								(Suggested)				
20.50																													
21.00																													
21.50																													
22.00																													
22.50	DS	22.50-22.95	22.50	15							SM	0	86	← 14 →						Non Plastic									
23.00																													
23.50																													
24.00																													
24.50																													
25.00																													
25.50																													
26.00	CS	26.40-27.40	26.40	Refusal	40.0	0.0	v v v	Highly weathered,fractured,medium grained,weak,Mica Schist.	26.40	-23.40	Metamorphic Rock																		
26.50							v v v																						
27.00	CS	27.40-28.40		>100	43.0	0.0	v v v																						
27.50							v v v																						
28.00	CS	28.40-29.40		>100	45.0	0.0	v v v		to	to																			
28.50							v v v																						
29.00	CS	29.40-30.40		>100	50.0	10.0	v v v																						
29.50							v v v																						
30.00							v v v		30.40	-27.40																			

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
26.40-27.40	2.66	2.20	2.64	-	7.00
29.40-30.40	2.68	1.10	2.71	158.00	8.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location:	Kattachira Rd
Chainage	313+595
Bore Hole No:	GT 76
R.L. of BH (m):	5.700

Termination Depth of Borehole : 20.00m

Date of starting:01.11.19

Date of completion:05.11.19

Period of Lab.Test :04.2.20 to 12.2.20

Static Ground Water Table:+5.20m

Method of boring : Rotary Mud Circulation, Rotary Drilling

Type of bit used:TC/Diamond

Co -ordinate 10°53'47.9"N 75°56'27.6"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e$_0$
0.00							▨		0.00	5.70																			
0.50																													
1.00																													
1.50	DS	1.50-1.95	1.50	12							CI	15	20	40	25					45	21	24					-		
2.00																													
2.50																													
3.00	DS	3.0-3.45	3.00	19							CI	2	23	56	19					42	21	21							
3.50																													
4.00																													
4.50	DS	4.50-4.95	4.50	23							CI	23	20	37	20	24.0	1.95	1.57	2.68	41	19	22	15		0.90	6.0		0.13	0.70
5.00																	(Suggested)									(Suggested)			
5.50																													
6.00	DS	6.0-6.45	6.00	33				Top surface soil followed by stiff to very stiff,reddish yellow silty clay with some gravels,calcareous nodules and sand.			CI	18	26	31	25					38	19	19							
6.50																													
7.00									to	to																			
7.50	DS	7.50-7.95	7.50	20							CI	4	27	48	21		1.93		2.66	42	20	22			0.90	5.0			
8.00																	(Suggested)									(Suggested)			
8.50																													
9.00																													
9.50																													
10.00																													
10.50	DS	10.50-10.95	10.50	74							CL	16	30	42	12					30	18	12							
11.00																													
11.50																													
12.00																													
12.50																													
13.00																													
13.50	DS	13.50-13.95	13.50	26							CI	0	17	55	28					44	20	24							
14.00																													
14.50									15.00	-9.30																			

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Kattachira Rd			
Chainage 313+595	Date of starting:01.11.19	Static Ground Water Table:+5.20m	
Bore Hole No: GT 76	Date of completion:05.11.19	Method of boring : Rotary Mud Circulation, Rotary Drilling	
R.L. of BH (m): 5.700	Period of Lab.Test :04.2.20 to 12.2.20	Type of bit used:TC/Diamond	
Termination Depth of Borehole : 20.00m		Co -ordinate	10°53'47.9"N 75°56'27.6"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
15.00	CS	15.0-16.0	15.00	Refusal	58.0	58.0	v v	Slightly weathered to fresh,dark grey,fine grained, moderately strong & hard Quartzite Gneiss.	15.00	-9.30	Metamorphic Rock																		
15.50							v v																						
16.00	CS	16.0-17.0			61.0	31.0	v v																						
16.50							v v																						
17.00	CS	17.0-18.0			95.0	90.0	v v																						
17.50							v v		to	to																			
18.00	CS	18.0-19.0			67.0	66.0	v v																						
18.50							v v																						
19.00	CS	19.0-20.0			52.0	52.0	v v																						
19.50							v v																						
20.00							v v		20.00	-14.30																			
20.50																													
21.00																													
21.50																													
22.00																													
22.50																													
23.00																													
23.50																													
24.00																													
24.50																													
25.00																													
25.50																													
26.00																													
26.50																													
27.00																													
27.50																													
28.00																													
28.50																													
29.00																													
29.50																													
30.00																													

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
15.0-16.0	2.79	0.80	2.75	245.00	11.00
17.0-18.0	2.75	1.00	2.70	201.00	8.00
19.0-20.0	2.82	0.40	2.85	258.00	13.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Approach of Ponnani River-Near Tirur Railway Station
Chainage 317+117
Date of starting:6.11.19
Static Ground Water Table:+11.30m
Bore Hole No: GT 77
Date of completion:10.11.19
Method of boring : Rotary Mud Circulation, Rotary Drilling
R.L. of BH (m): 11.600
Period of Lab.Test :04.2.20 to 12.2.20
Type of bit used:TC/Diamond
Termination Depth of Borehole : 16.75m
Co -ordinate 10°55'13.3"N 75°55'12.2"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristi	
			Depth (m)	Observed"N "Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00							▨	Top surface soil followed by medium to soft,brownish yellow silty clay with gravels,sand and calcareous nodules.	0.00	11.60																			
0.50																													
1.00																													
1.50	DS	1.50-1.95	1.50	8							CI	18	22	37	23	29.0	1.92	1.49	2.67	41	18	23	18		0.40	5.0	-	0.20	0.80
2.00																	(Suggested)									(Suggested)			
2.50									to	to																			
3.00	DS	3.0-3.45	3.00	23							CI	20	23	32	25					44	21	23							
3.50																													
4.00																													
4.50	DS	4.50-4.95	4.50	4							CI	0	23	55	22					42	20	22	18						
5.00									5.50	6.10																			
5.50							▨	Loose,brownish grey sandy silt,Gravels observed occasionally.	5.50	6.10																			
6.00	DS	6.0-6.45	6.00	8							ML	13	15	70	2					Non Plastic									
6.50	UDS	(UDS slipped due to non cohesive soil)																											
7.00																													
7.50	DS	7.50-7.95	7.50	6																									
8.00	UDS	(UDS slipped due to non cohesive soil)							to	to	ML	0	15	85	0		1.88			Non Plastic					0.10	16.0			
8.50																	(Suggested)								(Suggested)				
9.00																													
9.50																													
10.00																													
10.50	DS	10.50-10.95	10.50	5							ML	0	21	79	0					Non Plastic									
11.00									11.50	0.10																			
11.50	CS	11.75-12.75	11.75	Refusal	68.0	55.0	v v	Slightly weathered to fresh,dark grey,fine grained, moderately strong & hard Quartzite Gneiss.	11.50	0.10	Metamorphic Rock																		
12.00							v v																						
12.50	CS	12.75-13.75			73.0	71.5	v v																						
13.00							v v v																						
13.50	CS	13.75-14.75			62.0	62.0	v v		to	to																			
14.00							v v																						
14.50	CS	14.75-15.75			65.0	65.0	v v																						
15.00							v v																						
16.00	CS	15.75-16.75			74.0	74.0	v v																						
17.00							v v		16.75	-5.15																			

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight (gm/cc)	Water Absorption .(%)	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
11.75-12.75	2.85	1.10	2.79	246.00	12.00
13.75-14.75	2.78	1.30	2.82	225.00	13.00
15.75-16.75	2.79	0.50	2.81	262.00	13.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Tirur - ponnani Rd,Meenadathur
Chainage 319+842
Bore Hole No: GT 78
R.L. of BH (m): 6.100
Termination Depth of Borehole : 42.70m

Date of starting:06.11.19
Date of completion:08.11.19
Period of Lab.Test :04.2.20 to 12.2.20

Static Ground Water Table:+3.90m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°56'27.3"N 75°54'22.8"E

Notation

DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e$_0$
0.00							▨	Top surface soil followed by medium to dense,brownish to yellowish grey ,silty fine to medium sand.Lenses of mica observed scatterdly.	0.00	6.10																			
0.50																													
1.00																													
1.50	DS	1.50-1.95	1.50	11							SM	0	85	← 15 →						Non Plastic							-		
2.00																													
2.50																													
3.00	DS	3.0-3.45	3.00	14																									
3.50																													
4.00									to	to																			
4.50	DS	4.50-4.95	4.50	21							SM	0	82	← 18 →			1.95			Non Plastic					0.00	32.0			
5.00																	(Suggested)								(Suggested)				
5.50																													
6.00	DS	6.0-6.45	6.00	37																									
6.50																													
7.00																													
7.50	DS	7.50-7.95	7.50	38							SM	0	81	← 19 →						Non Plastic									
8.00									8.40	-2.30																			
8.50							▨	Medium to very stiff,brownish grey silty clay with some sand and calcareous nodules with gravels.	8.40	-2.30																			
9.00																													
9.50																													
10.00																													
10.50	DS	10.50-10.95	10.50	6							CI	0	3	68	29					41	21	20	13.00						
11.00																													
11.50																													
12.00									to	to																			
12.50																													
13.00																													
13.50	DS	13.50-13.95	13.50	25							CI	2	16	51	31		1.96		2.66	44	20	24			1.00	6.0			
14.00																	(Suggested)								(Suggested)				
14.50																													
15.00									25.00	-18.9																			

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Tirur - ponnani Rd,Meenadathur
Chainage 319+842
Bore Hole No: GT 78
R.L. of BH (m): 6.100
Termination Depth of Borehole : 42.70m

Date of starting:06.11.19
Date of completion:08.11.19
Period of Lab.Test :04.2.20 to 12.2.20

Static Ground Water Table:+3.90m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°56'27.3"N 75°54'22.8"E

Notation

DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
15.50								Medium to very stiff,brownish grey silty clay with some sand and calcareous nodules with gravels.																					
16.00																													
16.50	DS	16.50-16.95	16.50	29							CI	18	22	36	24					41	22	19							
17.00																													
17.50																													
18.00																													
18.50																													
19.00																													
19.50	DS	19.50-19.95	19.50	11							CI	4	22	46	28				2.68	44	22	22	18						
20.00																													
20.50																													
21.00																													
21.50																													
22.00																													
22.50	DS	22.50-22.95	22.50	16							CL	3	39	38	20					32	19	13							
23.00																													
23.50																													
24.00																													
24.50																													
25.00								Medium to very dense,brownish grey,silty micaceous fine to medium sand.	25.00	-18.9																			
25.50	DS	25.50-25.95	25.50	29							SM	0	71	←29→			1.88			Non Plastic					0.00	32.0			
26.00																	(Suggested)								(Suggested)				
26.50																													
27.00																													
27.50									to	to																			
28.00																													
28.50	DS	28.50-28.95	28.50	66							SM	0	78	←22→						Non Plastic									
29.00																													
29.50																													
30.00									30.50	-24.40																			

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Tirur - ponnani Rd,Meenadathur
Chainage 319+842
Bore Hole No: GT 78
R.L. of BH (m): 6.100
Termination Depth of Borehole : 42.70m

Date of starting:06.11.19
Date of completion:08.11.19
Period of Lab.Test :04.2.20 to 12.2.20

Static Ground Water Table:+3.90m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°56'27.3"N 75°54'22.8"E

Notation

DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
30.50								Very stiff,whitish grey,silty clay with some medium to fine sand.	30.50	-24.40																			
31.00																													
31.50	DS	31.50-31.95	31.50	21							CI	0	15	60	25		1.95								0.80	7.00			
32.00																	(Suggested)								(Suggested)				
32.50																													
33.00																													
33.50									to	to																			
34.00																													
34.50	DS	34.50-34.95	34.50	25							CI	0	17	52	31														
35.00																													
35.50																													
36.00																													
36.50																													
37.00									37.50	-31.4																			
37.50	DS	37.50-37.95	37.50	100				Completely weathered rock converted to very dense residual soil.	37.50	-31.4	ML	4	33	63	0					Non Plastic									
38.00																													
38.50																													
39.00									to	to																			
39.50																													
40.00									40.70	-34.6																			
40.50	CS	40.70-41.70	40.70	Refusal	96.0	81.0	v v v	Slightly weathered ,dark grey,fine grained,moderately strong & hard Hornblende Biotite Gneiss.	40.70	-34.6	Metamorphic Rock																		
41.00							v v v																						
41.50	CS	41.70-42.70			74.0	74.0	v v v																						
42.00							v v v		to	to																			
42.50							v v v																						
43.00							v v v		42.70	-36.6																			
43.50																													
44.00																													
44.50																													
45.00																													

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength,
40.70-41.70	2.85	0.40	2.82	281.00	14.00
41.70-42.70	2.82	0.50	2.82	265.00	10.00

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Tirur - ponnani Rd,Puthantheru
Chainage 325+105
Bore Hole No: GT 79
R.L. of BH (m): 2.700
Termination Depth of Borehole : 47.50m

Date of starting:12.11.19
Date of completion:17.11.19
Period of Lab.Test :04.2.20 to 12.2.20

Static Ground Water Table:+0.50m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°58'52.20"N 75°52'50.9"E

Notation

DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e$_0$
0.00							▦	Top surface soil followed by very loose to loose ,brownish grey micaceous silty fine to medium sand.	0.00	2.70																			
0.50																													
1.00																													
1.50	DS	1.50-1.95	1.50	6							SM	0	86	← 14 →						Non Plastic							-		
2.00																													
2.50																													
3.00	DS	3.0-3.45	3.00	2					to	to	SM	0	82	← 18 →						Non Plastic									
3.50																													
4.00																													
4.50	DS	4.50-4.95	4.50	6							SM	0	83	← 17 →			1.65		2.62	Non Plastic					0.00	26.0			
5.00																	(Suggested)								(Suggested)				
5.50																													
6.00	DS	6.0-6.45	6.00	13							SM	0	83	← 17 →						Non Plastic									
6.50									7.00	-4.30																			
7.00							▒	Very soft to soft,dark grey silty clay with little fine to medium sand.	7.00	-4.30																			
7.50	DS	7.50-7.95	7.50	2							CL	0	5	85	10														
8.00																													
8.50																													
9.00																													
9.50																													
10.00																													
10.50	DS	10.50-10.95	10.50	5																									
11.00	UDS	11.0-11.45							to	to	CI	2	6	64	28	29.0	1.89	1.47	2.66	44	20	24	14	TS	0.30	2.0	0.50	0.19	0.82
11.50																													
12.00																													
12.50																													
13.00																													
13.50	DS	13.50-13.95	13.50	4							CI	0	2	73	25					42	21	21							
14.00																													
14.50																													
15.00									15.50	-12.8																			

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location:	Tirur - ponnani Rd,Puthantheru		
Chainage	325+105	Date of starting:12.11.19	Static Ground Water Table:+0.50m
Bore Hole No:	GT 79	Date of completion:17.11.19	Method of boring : Rotary Mud Circulation, Rotary Drilling
R.L. of BH (m):	2.700	Period of Lab.Test :04.2.20 to 12.2.20	Type of bit used:TC/Diamond
Termination Depth of Borehole : 47.50m			Co -ordinate 10°58'52.20"N 75°52'50.9"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
15.50							▨		15.50	-12.8																			
16.00																													
16.50	DS	16.50-16.95	16.50	18							CI	0	10	62	28		1.94		2.68	44	20	24	17		1.00	3.00			
17.00																	(Suggested)								(Suggested)				
17.50																													
18.00																													
18.50																													
19.00																													
19.50	DS	19.50-19.95	19.50	50							SC	4	56	30	10					30	19	11	23						
20.00																													
20.50																													
21.00																													
21.50								Very stiff,brownish grey silty clay with some calcareous nodules and fine to medium sand.																					
22.00																													
22.50	DS	22.50-22.95	22.50	24					to	to	CI	0	16	56	28					39	20	19							
23.00																													
23.50																													
24.00																													
24.50																													
25.00																													
25.50	DS	25.50-25.95	25.50	26							CI	0	13	68	19					37	19	18							
26.00																													
26.50																													
27.00																													
27.50																													
28.00																													
28.50	DS	28.50-28.95	28.50	21							CI	0	11	58	31		1.98		2.66	45	21	24	16		1.20	5.00			
29.00																	(Suggested)								(Suggested)				
29.50																													
30.00									42.50	-39.8																			

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Tirur - ponnani Rd,Puthantheru
Chainage 325+105
Bore Hole No: GT 79
R.L. of BH (m): 2.700
Termination Depth of Borehole : 47.50m

Date of starting:12.11.19
Date of completion:17.11.19
Period of Lab.Test :04.2.20 to 12.2.20

Static Ground Water Table:+0.50m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 10°58'52.20"N 75°52'50.9"E

Notation

DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
30.50							▒	Very stiff,brownish grey silty clay with some calcareous nodules and fine to medium sand.																					
31.00							▒																						
31.50	DS	31.50-31.95	31.50	21			▒				CI	0	17	56	27					40	21	19							
32.00							▒																						
32.50							▒																						
33.00							▒																						
33.50							▒																						
34.00							▒																						
34.50	DS	34.50-34.95	34.50	14			▒				CI	0	22	48	30		1.91		2.68	39	19	20			0.80	7.00			
35.00							▒										(Suggested)								(Suggested)				
35.50							▒																						
36.00							▒																						
36.50							▒																						
37.00							▒																						
37.50	DS	37.50-37.95	37.50	16			▒																						
38.00							▒																						
38.50							▒																						
39.00							▒																						
40.50	DS	40.50-40.95	40.50	19			▒				CI	0	4	67	29					43	21	22	13						
							▒		42.50	-39.8																			
42.50	CS	42.50-43.50	42.50	Refusal	67.0	55.0	v v v v v v	Fresh,dark grey,fine grained, moderately strong & hard Quartzite Gneiss.	42.50	-39.8	Metamorphic Rock																		
43.50	CS	43.50-44.50			69.0	69.0	v v v v v v																						
44.50	CS	44.50-45.50			75.0	66.0	v v v v v v		to	to																			
45.50	CS	45.50-46.50			71.0	71.0	v v v v v v																						
46.50	CS	46.50-47.50			76.0	75.0	v v v		47.50	-44.8																			

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight (gm/cc)	Water Absorption (%)	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
42.50-43.50	2.72	0.60	2.75	305.00	16.00
44.50-45.50	2.85	0.30	2.86	289.00	15.00
46.50-47.50	2.82	0.90	2.80	285.00	15.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location:	Aproch of Poorappuzha		
Chainage	329+280	Date of starting:12.11.19	Static Ground Water Table:(-)4.10m
Bore Hole No:	GT 80	Date of completion:14.11.19	Method of boring : Rotary Mud Circulation, Rotary Drilling
R.L. of BH (m):	3.200	Period of Lab.Test :04.2.20 to 12.2.20	Type of bit used:TC/Diamond
Termination Depth of Borehole : 46.90m			Co -ordinate 11°01'02.0"N 75°52'12.1"E

Notation			
DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00							▨	Top surface soil followed by loose to medium dense,reddish yellow silty fine to medium sand.	0.00	3.20																			
0.50							▨																						
1.00							▨																						
1.50	DS	1.50-1.95	1.50	8			▨		to	to	SM	0	81	←19→						Non Plastic							-		
2.00							▨																						
2.50							▨																						
3.00	DS	3.0-3.45	3.00	12			▨				SM	0	86	←14→			1.55			Non Plastic					0.00	28.0			
3.50							▨		4.00	-0.80							(Suggested)								(Suggested)				
4.00							▦	Stiff to very stiff,reddish yellow silty clay with good percentage of fine to medium sand.	4.00	-0.80																			
4.50	DS	4.50-4.95	4.50	10			▦				CL	2	39	41	18		1.89		2.66	32	18	14	22		0.40	8.0			
5.00							▦										(Suggested)								(Suggested)				
5.50							▦																						
6.00	DS	6.0-6.45	6.00	20			▦																						
6.50							▦																						
7.00							▦																						
7.50	DS	7.50-7.95	7.50	15			▦				CL	1	34	44	21					33	18	15							
8.00							▦																						
8.50							▦																						
9.00							▦																						
9.50							▦		to	to																			
10.00							▦																						
10.50	DS	10.50-10.95	10.50	27			▦																						
11.00							▦																						
11.50							▦																						
12.00							▦																						
12.50							▦																						
13.00							▦																						
13.50	DS	13.50-13.95	13.50	23			▦				CI	1	14	59	26		2.00			38	19	19			1.00	5.0			
14.00							▦										(Suggested)								(Suggested)				
14.50							▦																						
15.00							▦		15.50	-12.3																			

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Aproch of Poorappuzha
Chainage 329+280
Bore Hole No: GT 80
R.L. of BH (m): 3.200
Termination Depth of Borehole : 46.90m

Date of starting:12.11.19
Date of completion:14.11.19
Period of Lab.Test :04.2.20 to 12.2.20

Static Ground Water Table:(-)4.10m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 11°01'02.0"N 75°52'12.1"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
15.50							▨	Hard,reddish brown,cementitous clayey medium to fine sand.Calcareous nodules observed closely.	15.50	-12.30																			
16.00																													
16.50	DS	16.50-16.95	16.50	55																									
17.00																													
17.50																													
18.00																													
18.50																													
19.00																													
19.50	DS	19.50-19.95	19.50	31							SC	0	52	36	12		2.00 (Suggested)		2.69	31	19	12			0.80	15.0 (Suggested)			
20.00									to	to																			
20.50																													
21.00																													
21.50																													
22.00																													
22.50	DS	22.50-22.95	22.50	37							SC	0	53	33	14					31	19	12							
23.00																													
23.50																													
24.00																													
24.50									25.00	-21.8																			
25.00							▨	Dense,brownish yellow with bluish laminated silty fine to medium sand.	25.00	-21.80																			
25.50	DS	25.50-25.95	25.50	29							SM	0	68	← 32 →			1.90 (Suggested)		2.63	Non Plastic					0.00	33.0 (Suggested)			
26.00																													
26.50																													
27.00																													
27.50									to	to																			
28.00																													
28.50	DS	28.50-28.95	28.50	52							SM	3	81	← 16 →						Non Plastic									
29.00																													
29.50																													
30.00									41.90	-38.7																			

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Aproch of Poorappuzha
Chainage 329+280
Bore Hole No: GT 80
R.L. of BH (m): 3.200
Termination Depth of Borehole : 46.90m

Date of starting:12.11.19
Date of completion:14.11.19
Period of Lab.Test :04.2.20 to 12.2.20

Static Ground Water Table:(-)4.10m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 11°01'02.0"N 75°52'12.1"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
30.50								Dense to very dense ,brownish yellow with bluish laminated silty fine to medium sand.																					
31.00																													
31.50	DS	31.50-31.95	31.50	67							SM	0	82	← 18 →			2.00			Non Plastic					0.00	35.0			
32.00																	(Suggested)								(Suggested)				
32.50																													
33.00																													
33.50																													
34.00																													
34.50	DS	34.50-34.95	34.50	40							SM	0	81	← 19 →						Non Plastic									
35.00																													
35.50																													
36.00																													
36.50																													
37.00																													
37.50	DS	37.50-37.95	37.50	69							SM	0	82	← 18 →						Non Plastic									
38.00																													
38.50																													
39.00																													
40.50	DS	40.50-40.95	40.50	56																									
41.50	CS	41.90-42.90	41.90	Refusal	57.0	57.0	v v v v v v	Slightly weathered to fresh,dark grey,fine grained,moderately strong & hard Hornblende Biotite Gneiss.	41.90	-38.70	Metamorphic Rock																		
42.50	CS	42.90-43.90			52.0	52.0	v v v v v v																						
43.50	CS	43.90-44.90			54.0	54.0	v v v v v v		to	to																			
44.50	CS	44.90-45.90			59.0	59.0	v v v v v v																						
45.50	CS	45.90-46.90			53.0	50.0	v v v v v v		46.90	-43.7																			

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
41.90-42.90	2.80	0.60	2.82	255.00	13.00
43.90-44.90	2.82	0.80	2.82	245.00	8.00
45.90-46.90	2.82	0.80	2.78	245.00	9.00

M/s ANAND RAJ INFRATECH PVT. LTD.
Fatuha,Patna

CHEMICAL TEST RESULT

Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

	Chemical Test on Water sample					Chemical Test on Soil sample		
Location	BH No.	Depth (m)	pH value at 32^0c	Chloride content (mg/lit)	Sulphate content (mg/lit)	Sulphate content (%)	Chloride Content (%)	pH value at 32^0c
-	GT 50B	3.00	7.20	69.00	224.000	0.030	0.050	7.300
	GT51A	6.00	7.20	78	201	0.02	0.06	7.000
	GT52A	3.00	7.10	78	225	0.08	0.03	7.500
	GT53A	6.00	7.20	85	231	0.02	0.05	7.100
	GT 54	10.50	6.70	55	192	0.07	0.02	6.800
	GT 57B	4.50	6.60	55	198	0.02	0.03	6.900
	GT58A	3.00	7.20	69	201	0.08	0.05	7.200

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

CHEMICAL TEST RESULT

Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

	Chemical Test on Water sample					Chemical Test on Soil sample		
Location	BH No.	Depth (m)	pH value at 32^0c	Chloride content (mg/lit)	Sulphate content (mg/lit)	Sulphate content (%)	Chloride Content (%)	pH value at 32^0c
-	GT 60	10.50	6.60	78.00	198.00	0.050	0.060	7.000
	GT 61	7.00	6.80	88.00	225.00	0.07	0.02	6.800
	GT 62	7.00	7.30	89.00	201.00	0.03	0.07	6.800
	GT 63	8.00	7.10	89.00	238.00	0.08	0.02	6.500
	GT 64	4.00	7.00	85.00	201.00	0.02	0.08	7.000
	GT 65	6.00	6.50	80.00	224.00	0.08	0.02	6.900
	GT 67	6.00	7.10	92.00	201.00	0.05	0.03	7.200
	GT 68	3.00	6.90	88.00	225.00	0.08	0.05	7.100
	GT 69A	6.00	7.20	92.00	199.00	0.02	0.07	6.600
	GT 70	4.50	7.00	90.00	225.00	0.02	0.05	6.600

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

CHEMICAL TEST RESULT

Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

Location	Chemical Test on Water sample					Chemical Test on Soil sample		
	BH No.	Depth (m)	pH value at 32^0c	Chloride content (mg/lit)	Sulphate content (mg/lit)	Sulphate content (%)	Chloride Content (%)	pH value at 32^0c
-	GT 55A	3.00	6.80	71.00	145.00	0.030	0.050	6.500
	GT 71	3.00	7.10	89.00	158.00	0.01	0.10	6.900
	GT 72	7.50	6.60	99.00	138.00	0.09	0.10	7.100
	GT 73	7.50	6.50	118.00	112.00	0.1	0.05	7.000
	GT 74	7.50	6.60	77.00	158.00	0.05	0.02	6.600
	GT 75A	6.50	7.00	89.00	188.00	0.02	0.06	7.200
	GT 76	7.50	6.50	102.00	225.00	0.02	0.09	6.600
	GT 77	3.00	7.20	99.00	205.00	0.02	0.09	6.800
	GT 78	10.50	6.70	89.00	198.00	0.06	0.02	7.000
	GT 79	11.00	7.00	102.00	201.00	0.05	0.09	7.200
	GT 80	13.50	6.60	77.00	155.00	0.05	0.02	6.900

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 81
Location:	Chainage 333+462	Reduced Level:	71.00
Coordinates:	X - 11° 3'9.02"N Y- 75°51'27.19"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	68.50 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	12.11.19 To 15.11.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								░	
1.50	1.95	0.45	P	1	2	0	2				░	
3.00	3.45	0.45	P	4	3	5	8				░	Loose to medium dense brownish grey silty fine to medium sand.
3.50	3.95	0.45	U	Sliped							░	
4.50	4.95	0.45	P	12	21	25	46				░	
6.00	6.45	0.45	P	3	6	18	24				░	7.00m
7.50	7.95	0.45	P	5	2	1	3				▨	Soft dark grey silty clay with decomposed. 10.00m
10.50	10.95	0.45	P	12	19	21	40				▨	Hard brownish grey sandy silty clay. 13.00m
13.50	13.95	0.45	P	2	2	3	5				▨	Soft dark grey silty clay with decomposed.
14.50	14.95	0.45	U	Sliped							▨	15.50m
16.50	16.95	0.45	P	8	8	12	20				▧	
19.50	19.95	0.45	P	6	8	9	17				▧	
22.50	22.95	0.45	P	4	7	8	15				▧	Very stiff brownish grey sandy clayey silt with gravels.
25.50	25.95	0.45	P	10	13	14	27				▧	
28.50	28.95	0.45	P	5	6	8	14				▧	
31.50	31.95	0.45	P	4	7	9	16				▧	
34.29	34.74	0.45	P	100 for 1 cm			>100	34.29	35.29	70 / 61	☰	34.29m
								35.29	36.29	66 / 66	☰	
								36.29	37.29	69 / 57	☰	Moderately to slightly weathered greyish fine to medium grained hard metamorphic rock.
								37.29	38.29	66 / 55	☰	
								38.29	39.29	60 / 57	☰	
39.29	(Termination Depth)										☰	

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project: Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.
Bore Hole No: GT- 82

Location: Chainage 337+815
Reduced Level: 12.70

Coordinates: X - 11° 05'28.1"N
Y- 75°51'06.2"E
Method of Boring / Drilling: Rotary

Standing Water Level: 11.10 b.g.l
Dia.of Boring / Drilling: Sx / Nx

Casing Lowered: 3.00 m
Date : From 15.11.19 To 17.11.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								░	
1.50	1.95	0.45	P	7	2	3	5					Loose to medium dense brownish grey silty fine to medium sand.
3.00	3.45	0.45	P	5	7	7	14					
4.50	4.95	0.45	P	7	6	7	13					
6.00	6.45	0.45	P	1	1	2	3				▨	5.50m Soft dark grey silty clay with decomposed.
7.00	7.45	0.45	U		Sliped							
7.50	7.95	0.45	P	6	9	13	22					7.00m
10.50	10.95	0.45	P	9	13	18	31					
13.50	13.95	0.45	P	11	16	21	37					Very stiff brownish grey sandy silty clay with gravels.
16.50	16.95	0.45	P	5	7	9	16					
19.50	19.95	0.45	P	7	8	11	19					
20.50	20.95	0.45	P	100 for 1 cm			>100	20.60	21.60	85 / 65	☰	20.50m
								21.60	22.60	55 / 55		
								22.60	23.60	60 / 60		Moderately to slightly weathered greyish fine to medium grained hard metamorphic rock.
								23.60	24.60	78 / 63		
								24.60	25.60	75 / 75		
25.60	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project: Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No: GT- 83

Location: Chainage 342+123

Reduced Level: 11.20

Coordinates: X - 11° 7'31.46"N
Y- 75°49'58.09"E

Method of Boring / Drilling: Rotary

Standing Water Level: 10.40 b.g.l

Dia.of Boring / Drilling: Sx / Nx

Casing Lowered: 3.00 m

Date : From 16.11.19 To 18.11.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								░	Medium dense brownish grey silty fine to medium sand.
1.50	1.95	0.45	P	5	7	9	16				░	2.10m
3.00	3.45	0.45	P	3	1	1	2				▨	
4.50	4.95	0.45	P	1	0	0	0				▨	
5.00	5.45	0.45	U								▨	
6.00	6.45	0.45	P	1	1	0	1				▨	Soft dark grey silty clay with decomposed.
7.50	7.95	0.45	P	2	1	0	1				▨	
10.50	10.95	0.45	P	1	1	0	1				▨	
11.00	11.45	0.45	U	Sliped							▨	
13.50	13.95	0.45	P	1	1	1	2				▨	
14.50	14.95	0.45	U								▨	16.00m
16.50	16.95	0.45	P	38	66	100	>100				░	Very dense brownish grey sand with gravels traces of rock fragments.
17.50	17.95	0.45	P	100 for 1 cm			>100	17.50	18.50	65 / 55	☰	17.50m
								18.50	19.50	74 / 64	☰	
								19.50	20.50	55 / 52	☰	Moderately to slightly weathered greyish fine to medium grained hard metamorphic rock.
								20.50	21.50	59 / 55	☰	
								21.50	22.50	67 / 64	☰	
22.50	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project: Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No: GT- 84

Location: Chainage 348+542

Reduced Level: 2.80

Coordinates: X - 11°10'52.5"N
Y- 75°49'42.3"E

Method of Boring / Drilling: Rotary

Standing Water Level: 1.80 b.g.l

Dia.of Boring / Drilling: Sx / Nx

Casing Lowered: 3.00 m

Date : From 16.11.19 To 18.11.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								░	Medium dense brownish grey silty fine to medium sand.
1.50	1.95	0.45	P	3	6	6	12				░	2.50m
3.00	3.45	0.45	P	1	1	1	2				▨	
4.50	4.95	0.45	P	1	2	2	4				▨	Soft dark grey silty clay with decomposed.
6.00	6.45	0.45	P	1	1	2	3				▨	7.00m
7.50	7.95	0.45	P	6	5	7	12				░	
10.50	10.95	0.45	P	50			>100				░	
13.50	13.95	0.45	P	7	8	9	17				░	Medium dense brownish grey silty fine to medium sand with gravels.
16.50	16.95	0.45	P	8	10	12	22				░	19.50m
19.50	19.95	0.45	P	100 for 1 cm			>100	19.50	20.50	31 / Nil	☰	
								20.50	21.50	61 / 53	☰	Moderately to slightly weathered greyish fine to medium grained hard metamorphic rock.
								21.50	22.50	67 / 59	☰	
								22.50	23.50	51 / 34	☰	
23.50	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 85
Location:	Chainage 353+830	Reduced Level:	3.20
Coordinates:	X - 11°12'53.4"N Y- 75°47'41.0"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	1.60 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	19.11.19 To 21.11.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D									Medium dense reddish grey silty fine to medium sand with gravels.
1.50	1.95	0.45	P	6	6	7	13					
3.00	3.45	0.45	P	6	6	9	15					
4.50	4.95	0.45	P	6	7	7	14					
6.00	6.45	0.45	P	5	7	7	14					
7.50	7.95	0.45	P	6	7	8	15					7.00m Very stiff to hard reddish grey sandy clayey silt with gravels.
10.50	10.95	0.45	P	5	6	7	13					
13.50	13.95	0.45	P	14	19	23	42					
16.50	16.95	0.45	P	26	35	41	76					
18.50	18.95	0.45	P	7	11	13	24					
22.50	22.95	0.45	P	7	14	18	32					
25.50	25.95	0.45	P	12	16	23	39					
28.50	28.95	0.45	P	21	47	53	100					26.50m Very dense brownish grey sand with gravels traces of rock fragments.
29.80	30.25	0.45	P	100 for 1 cm			>100	29.80	30.80	85 / 55		29.80m Moderately to slightly weathered greyish fine to medium grained hard metamorphic rock.
								30.80	31.80	73 / 63		
								31.80	32.80	80 / 56		
								32.80	33.80	82 / 62		
								33.80	34.80	84 / 62		
34.80	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project: Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No: GT- 86

Location: Chainage 356+370

Reduced Level: 2.90

Coordinates: X - 11°14'10.2"N
Y- 75°47'11.1"E

Method of Boring / Drilling: Rotary

Standing Water Level: 2.40 b.g.l

Dia.of Boring / Drilling: Sx / Nx

Casing Lowered: 3.00 m

Date : From 21.11.19 To 23.11.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D									
1.50	1.95	0.45	P	20	18	15	33					Medium dense brownish grey silty fine to medium sand.
3.00	3.45	0.45	P	3	4	11	15					
4.50	4.95	0.45	P	6	8	8	16					
6.00	6.45	0.45	P	7	6	9	15					7.00m
7.50	7.95	0.45	P	8	15	16	31					
10.50	10.95	0.45	P	7	11	11	22					Very stiff to hard brownish grey sandy silty clay with gravels.
13.50	13.95	0.45	P	7	9	11	20					
16.50	16.95	0.45	P	8	7	8	15					
19.50	19.95	0.45	P	7	19	32	51					19.50m
22.50	22.95	0.45	P	100 for 1 cm			>100	22.60	23.60	54 / 54		
								23.60	24.60	80 / 50		Moderately to slightly weathered greyish fine to medium grained hard metamorphic rock.
								24.60	25.60	49 / 48		
								25.60	26.60	64 / 64		
								26.60	27.60	72 / 72		
27.60	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 86A
Location:	Chainage 357+395	Reduced Level:	3.40
Coordinates:	X - 11°14'35"N Y- 75°46'48"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	2.40 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From 14.02.20 To	16.02.20

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								░	Loose greyish clayey silty sand with gravels.
1.50	1.45	0.45	P	2	2	2	4				░	
3.00	3.45	0.45	P	2	2	3	5				░	
4.50	4.95	0.45	P	3	4	5	9				░	
6.00	6.45	0.45	P	40	100 for 4 cm		>100				▨	6.00m
7.50	7.95	0.45	P	50	100 for 5 cm		>100				▨	Very hard reddish grey sandy clayey silt with gravels traces of rock fragments.
10.50	10.95	0.45	P	40	100 for 6 cm		>100				▨	
13.50	13.95	0.45	P	50	100 for 7 cm		>100				▨	
16.50	16.95	0.45	P	37	51	62	>100				▨	
19.50	19.95	0.45	P	25	62	100	>100				▨	
19.50	(Termination Depth)										▨	

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project: Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No: GT- 87

Location: Chainage 357+674

Reduced Level: 2.80

Coordinates: X - 11°14'44.15"N
Y- 75°46'47.78"E

Method of Boring / Drilling: Rotary

Standing Water Level: 1.80 b.g.l

Dia.of Boring / Drilling: Sx / Nx

Casing Lowered: 3.00 m

Date : From 27.11.19 To 02.12.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D									Loose brownish grey silty fine to medium sand.
1.50	1.95	0.45	P	1	0	1	1					
3.50	3.95	0.45	P	3	4	5	9					
4.50	4.95	0.45	P	1	1	4	5					
6.00	6.45	0.45	P	9	13	20	33					6.00m Medium dense to very dense brownish grey sand with gravels traces of rock fragments.
7.50	7.95	0.45	P	30	40	55	95					
10.50	10.95	0.45	P	10	12	16	28					
12.50	12.95	0.45	P	100 for 1 cm			>100	12.50	13.50	25 / 16		11.00m Moderately weathered greyish fine to medium grained hard metamorphic rock.
16.50	16.95	0.45	P	3	4	6	10					14.00m Stiff to very stiff brownish grey sandy silty clay with gravels.
19.50	19.95	0.45	P	4	5	3	8					
22.50	22.95	0.45	P	6	8	10	18					
25.50	25.95	0.45	P	7	9	12	21					
28.50	28.95	0.45	P	11	25	25	50					27.00m Very stiff to hard brownish grey sandy clayey silt with gravels.
31.50	31.95	0.45	P	11	16	20	36					
34.50	34.95	0.45	P	16	19	22	41					
37.50	37.95	0.45	P	16	20	24	44					
38.00	38.45	0.45	P	100 for 1 cm			>100	38.00	39.50	94 / 77		38.00m Moderately to slightly weathered greyish fine to medium grained hard metamorphic rock.
								39.50	41.00	90 / 76		
								41.00	42.00	88 / 72		
								42.00	43.00	62 / 52		
43.00	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project: Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No: GT- 87A

Location: Chainage 357+978

Reduced Level: 3.40

Coordinates: X - 11°14'54"N
Y- 75°46'46"E

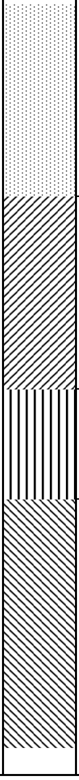
Method of Boring / Drilling: Rotary

Standing Water Level: 0.45 b.g.l

Dia.of Boring / Drilling: Sx / Nx

Casing Lowered: 3.00 m

Date **:** From 14.02.20 To 17.02.20

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D									
3.00	1.45	0.45	P	3	4	6	10					Medium dense brownish grey silty fine to medium sand with gravels.
4.50	4.95	0.45	P	2	4	5	9					
6.00	6.45	0.45	P	6	7	8	15					7.50m
7.50	7.95	0.45	P	60 for 4 cm			>100					
10.50	10.95	0.45	P	25	20	15	35					Hard to very hard reddish grey sandy silty clay morrum mixed with gravels.
13.50	13.95	0.45	P	20	25	28	53					
15.00	15.45	0.45	P	100 for 1cm			>100	15.00	16.50	30/ Nil		15.00m
16.50	16.95	0.45	P	41	66 for 7 cm		>100	16.50	17.50	10/ Nil		Completely weathered yellowish grey finly grained very weak mud stone.
19.50	19.95	0.45	P	25	28	30	58					19.00m
22.50	22.95	0.45	P	60 for 1cm			>100					Very hard reddish grey sandy clayey silt with gravels traces of rock fragments.
25.50	25.95	0.45	P	18	100 for 1cm		>100					
27.50	27.95	0.45	P	25	38	68	>100					
27.50	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 88
Location:	Chainage 363+490	Reduced Level:	68.60
Coordinates:	X - 11°17'40.95"N Y- 75°45'40.75"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	67.60 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	29.11.19 To 01.12.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D									Medium dense brownish grey silty fine to medium sand.
1.50	1.95	0.45	P	1	2	4	6					
3.00	3.45	0.45	U	Sliped								
3.50	3.95	0.45	P	2	5	6	11					
4.50	4.95	0.45	P	3	6	7	13					
												5.50m
6.00	6.45	0.45	P	6	15	35	50					Very hard reddish grey calcite mixed sandy silty clay with gravels.
7.50	7.95	0.45	P	8	110	60	>100					
10.50	10.95	0.45	P	50			>100					
												11.00m
12.50	12.95	0.45	P	5	7	9	16					Very stiff brownish grey sandy silty clay with gravels.
14.50	14.95	0.45	P	7	10	12	22					
19.50	19.95	0.45	P	7	10	11	21					
22.50	22.95	0.45	P	7	7	10	17					
												25.50m
25.50	25.95	0.45	P	100 for 1 cm			>100	25.50	27.00	40 / Nil		Moderately to slightly weathered greyish fine to medium grained hard metamorphic rock.
								27.00	28.50	85 / 55		
								28.50	30.00	85 / 50		
								30.00	31.50	89 / 54		
								31.00	32.00	100 / 56		
32.00	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 89
Location:	Chainage 366+633	Reduced Level:	12.80
Coordinates:	X - 11°19'15.4"N Y- 75°45'00.9"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	8.80 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	26.11.19 To 27.11.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								▨	Very stiff bronish grey sandy clayey silt with gravels.
1.50	1.95	0.45	P	6	10	14	24					
3.00	3.45	0.45	U									
3.50	3.95	0.45	P	20	100 for 4 cm		>100				░	3.50m Very dense reddish grey silty sand mixed with morrum.
4.50	4.95	0.45	P	23	100 for 8 cm		>100					
6.00	6.45	0.45	P	10	15	25	40				▨	5.00m Hard reddish grey sandy clayey silt with gravels.
7.50	7.95	0.45	P	20	100 for 6 cm		>100				░	7.00m Very dense yellowish grey sand with gravels traces of rock fragments.
10.50	10.95	0.45	P	40	100 for 5 cm		>100					
13.50	13.95	0.45	P	25	100 for 11 cm		>100					
16.50	16.95	0.45	P	100 for 2 cm			>100					
16.50	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 90
Location:	Chainage 370+771	Reduced Level:	6.70
Coordinates:	X - 11°21'20.4"N Y- 75°44'30.2"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	5.20 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From 25.11.19 To	26.11.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								▨	Stiff to very stiff reddish grey sandy clayey silt with morrum.
1.50	1.95	0.45	P	7	2	3	5				▨	
3.00	3.45	0.45	P	8	7	9	16				▨	
4.50	4.95	0.45	P	7	12	17	29				▨	
6.00	6.45	0.45	P	4	9	16	25				▨	
7.50	7.95	0.45	P	13	14	24	38				░	7.50m Dense reddish grey silty fine to medium sand.
10.50	10.95	0.45	P	12	18	26	44				░	
11.00	11.45	0.45	P	100 for 1 cm			>100	11.00	12.50	85 / 65	▤	11.00m Moderately to slightly weathered greyish fine to medium grained hard metamorphic rock.
								12.50	14.00	90 / 89	▤	
								14.00	15.00	70 / 70	▤	
								15.00	16.00	76 / 76	▤	
16.00	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project: Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No: GT- 91

Location: Chainage 375+335

Reduced Level: 16.10

Coordinates: X - 11°23'39"N
Y- 75°43'33"E

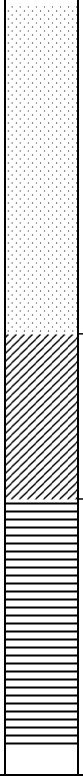
Method of Boring / Drilling: Rotary

Standing Water Level: 14.60 b.g.l

Dia.of Boring / Drilling: Sx / Nx

Casing Lowered: 3.00 m

Date : From 01.12.19 To 02.12.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D									
1.50	1.95	0.45	P	2	3	4	7					
3.00	3.45	0.45	P	3	6	8	14					Medium dense to dense greyish silty fine to medium sand.
4.50	4.95	0.45	P	4	6	9	15					
6.00	6.45	0.45	P	5	12	20	32					
7.50	7.95	0.45	P	6	13	28	41					
9.00	9.45	0.45	P	100			>100					9.00m
10.50	10.95	0.45	P	9	50	100	>100					Very hard reddish grey with black patches sandy silty clay with calcereous nodules.
13.50	13.95	0.45	P	5	15	18	33					
16.00	16.45	0.45	P	75			>100	16.00	17.00	65 / 52		16.00m
								17.00	18.50	64 / 56		Moderately weathered greyish fine to medium grained hard metamorphic rock.
								18.50	20.00	81 / 60		
								20.00	21.00	61 / 58		
21.00	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project: Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No: GT- 92

Location: Chainage 381+758

Reduced Level: 6.70

Coordinates: X - 11°26'37"N
Y- 75°41'43"E

Method of Boring / Drilling: Rotary

Standing Water Level: 6.10 b.g.l

Dia.of Boring / Drilling: Sx / Nx

Casing Lowered: 3.00 m

Date : From 04.12.19 **To** 07.12.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D									Medium dense to dense brownish grey silty fine to medium sand binded with clay.
1.50	1.95	0.45	P	3	6	7	13					
3.00	3.45	0.45	P	4	7	7	14					
4.50	4.95	0.45	P	4	7	8	15					
6.00	6.45	0.45	P	6	8	9	17					
7.50	7.95	0.45	P	3	7	8	15					
10.50	10.95	0.45	P	6	10	15	25					
13.50	13.95	0.45	P	7	13	18	31					
16.50	16.95	0.45	P	5	12	18	30					
19.50	19.95	0.45	P	6	13	19	32					
22.50	22.95	0.45	P	77			>100					22.50m Very dense reddish grey medium sand with gravels traces of rock fragments.
25.50	25.95	0.45	P	100 for 13 cm			>100					
28.50	28.95	0.45	P	8	12	20	32					28.00m Very stiff brownish grey clayey sandy silt with gravels.
31.50	31.95	0.45	P	8	13	24	37					
34.50	34.95	0.45	P	10	29	46	75					34.50m Very dense yellowish grey medium sand with gravels traces of rock fragments.
37.50	37.95	0.45	P	100 for 12 cm			>100					
39.50	39.95	0.45	P	100 for 8 cm			>100					
42.50	42.95	0.45	P	100 for 6 cm			>100					
42.50	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 93
Location:	Chainage 387+055	Reduced Level:	2.90
Coordinates:	X - 11°28'18.9"N Y- 75°39'25.4"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	1.90 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	02.12.19 To 06.12.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								░	Medium dense brownish grey silty fine to medium sand binded with clay.
1.50	1.95	0.45	P	1	2	4	6					
3.00	3.45	0.45	P	3	3	5	8					
4.50	4.95	0.45	P	4	5	5	10					
6.00	6.45	0.45	P	10	12	16	28					
7.50	7.95	0.45	P	3	4	5	9					
10.50	10.95	0.45	P	4	10	10	20					11.50m
13.50	13.95	0.45	P	4	6	6	12				▩	Very stiff brownish grey clayey sandy silt with gravels.
16.50	16.95	0.45	P	5	6	7	13					
19.50	19.95	0.45	P	9	6	8	14					
22.50	22.95	0.45	P	8	10	11	21					23.50m
23.50	23.95	0.45	P	100 for 10 cm			>100	23.50	25.00	71 / 63	☰	Moderately to slightly weathered greyish fine to medium grained hard metamorphic rock.
								25.00	26.50	91 / 45		
								26.50	27.50	98 / 83		
								27.50	28.50	98 / 53		
28.50	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project: Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No: GT- 94

Location: Chainage 393+158

Reduced Level: 16.90

Coordinates: X - 11°31'15"N
Y- 75°37'51"E

Method of Boring / Drilling: Rotary

Standing Water Level: 15.70 b.g.l

Dia.of Boring / Drilling: Sx / Nx

Casing Lowered: 3.00 m

Date : From 03.12.19 To 07.12.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								▨	Very stiff brownish grey sandy silty clay with gravels.
1.50	1.95	0.45	P	5	8	10	18					
3.00	3.45	0.45	P	5	9	10	19					
4.50	4.95	0.45	P	15	22	38	60					
6.00	6.45	0.45	P	12	14	18	32					
7.50	7.95	0.45	P	6	8	11	19					
10.50	10.95	0.45	U									
13.50	13.95	0.45	P	7	9	13	22					
16.50	16.95	0.45	P	5	8	10	18					
19.50	19.95	0.45	P	6	9	12	21					
22.50	22.95	0.45	P	5	11	17	28					
25.50	25.95	0.45	P	5	13	19	32					26.00m
26.00	26.45	0.45	P	100 for 10 cm			>100	26.00	27.00	36 / Nil	▤	Moderately to slightly weathered greyish fine to medium grained hard metamorphic rock.
								27.00	28.50	77 / 69		
								28.50	30.00	84 / 20		
								30.00	31.00	86 / 82		
								31.00	32.00	98 / 59		
32.00	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 95
Location:	Chainage 398+550	Reduced Level:	2.80
Coordinates:	X - 11°33'55.2"N Y- 75°37'13.2"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	1.30 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	07.12.19 To 09.12.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								░	
1.50	1.95	0.45	P	1	2	3	5				░	
3.00	3.45	0.45	P	2	4	5	9				░	Loose to medium dense reddish grey silty fine to medium sand.
4.50	4.95	0.45	P	3	4	5	9				░	
6.00	6.45	0.45	P	4	4	7	11				░	
7.50	7.95	0.45	P	3	5	5	10				░	10.50m
10.50	10.95	0.45	U								▨	
13.50	13.95	0.45	P	2	10	13	23				▨	Very stiff reddish grey sandy silty clay with gravels.
16.50	16.95	0.45	P	7	12	18	30				▨	
19.50	19.95	0.45	P	15	20	100	>100				▒	19.50m
22.50	22.95	0.45	P	19	35	100	>100				▒	Very dense dark grey fine to medium sand with gravels traces of weathered rock fragments.
25.50	25.95	0.45	P	100 for 11 cm			>100				▒	
25.50	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project: Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No: GT- 96

Location: Chainage 403+315

Reduced Level: 11.00

Coordinates: X - 11°36'19.4"N
Y- 75°36'40.5"E

Method of Boring / Drilling: Rotary

Standing Water Level: 10.00 b.g.l

Dia.of Boring / Drilling: Sx / Nx

Casing Lowered: 3.00 m

Date : From 08.12.19 To 09.12.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								▨	Stiff reddish grey sandy silty clay with gravels.
1.50	1.95	0.45	P	2	3	4	7				▨	
3.00	3.45	0.45	U								▨	
												4.50m
4.50	4.95	0.45	P	62	32 for 4 cm		>100				▩	Very hard brownish grey clayey sandy silt with gravels.
6.00	6.45	0.45	P	62	55 for 13 cm		>100				▩	
7.50	7.95	0.45	P	15	55 for 6 cm		>100				▩	
10.50	10.95	0.45	P	25	40 for 6 cm		>100				▩	
13.50	13.95	0.45	P	30	60 for 10 cm		>100				▩	
16.50	16.95	0.45	P	100 for 10 cm			>100				▩	
19.50	19.95	0.45	P	100 for 7 cm			>100				▩	
19.50	(Termination Depth)										▩	

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project: Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No: GT- 97

Location: Chainage 409+007

Reduced Level: 14.40

Coordinates: X - 11°38'38.0"N
Y- 75°34'38.0"E

Method of Boring / Drilling: Rotary

Standing Water Level: 13.90 b.g.l

Dia.of Boring / Drilling: Sx / Nx

Casing Lowered: 3.00 m

Date : From 13.12.19 To 18.12.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								▨	Firm to stiff reddish grey with black patches sandy silty clay.
1.50	1.95	0.45	P	4	5	7	12				▨	
2.00	2.45	0.45	U								▨	
3.00	3.45	0.45	P	3	5	6	11				▨	
4.50	4.95	0.45	U								▨	
6.00	6.45	0.45	P	2	2	2	4				▨	
7.50	7.95	0.45	U								▨	
10.50	10.95	0.45	P	4	5	7	12				░	10.50m Medium dense greyish silty fine to medium sand with gravels.
13.50	13.95	0.45	P	5	7	8	15				░	
16.50	16.95	0.45	P	4	6	7	13				░	
20.00	20.45	0.45	P	100 for 15 cm			>100				▥	18.00m Very dense yellowish grey medium sand with gravels traces of rock fragments.
21.00	21.45	0.45	P	100			>100	21.00	22.00	65 / 11	☰	21.00m Moderately to slightly weathered greyish fine to medium grained hard metamorphic rock.
								22.00	23.50	76 / 59	☰	
								23.50	24.50	74 / 74	☰	
								24.50	26.00	86 / 86	☰	
								26.00	27.00	90 / 87	☰	
27.00	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 98
Location:	Chainage 413+889	Reduced Level:	12.60
Coordinates:	X - 11°40'49.1"N Y- 75°33'07"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	10.30 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	21.11.19 To 22.11.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								░	
1.50	1.95	0.45	P	6	7	10	17				░	Medium dense brownish grey silty fine to medium sand.
3.00	3.45	0.45	P	6	7	11	18				░	
4.50	4.95	0.45	P	6	8	10	18				░	
												5.50m
6.00	6.45	0.45	U								▨	
6.50	6.95	0.45	P	1	1	1	2				▨	
7.50	7.95	0.45	P	1	2	4	6				▨	Firm to stiff reddish grey with black patches sandy silty clay with gravels.
9.00	9.45	0.45	U								▨	
10.50	10.95	0.45	P	6	8	10	18				▨	
13.50	13.95	0.45	U								▨	
												16.50m
16.50	16.95	0.45	P	20	70		>100	16.75	17.75	85 / 65	☰	
								17.75	19.75	90 / 89	☰	Moderately to slightly weathered greyish fine to medium grained hard metamorphic rock.
								19.75	20.75	70 / 70	☰	
								20.75	21.75	76 / 76	☰	
21.75	(Termination Depth)										☰	

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

BORE / DRILL LOG

Project:	Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.	Bore Hole No:	GT- 99
Location:	Chainage 416+800	Reduced Level:	11.40
Coordinates:	X - 11°42'22.1"N Y- 75°32'57.8"E	Method of Boring / Drilling:	Rotary
Standing Water Level:	9.50 b.g.l	Dia.of Boring / Drilling:	Sx / Nx
Casing Lowered:	3.00 m	Date : From	09.12.19 To 11.12.19

Depth (m)		Length (m)	Nature of Sampling	SPT : No. of blows				Run			Symbolic Profile	Description
From	To			0-15 cm	15-30 cm	30-45 cm	N' Value	From	To	C.R. / R.Q.D. (%)		
0.50	-	-	D								▨	Very stiff reddish grey sandy silty clay with gravels.
1.50	1.95	0.45	P	5	9	10	19				▨	2.50m
3.00	3.45	0.45	P	6	8	9	17				░	
4.50	4.95	0.45	P	10	12	16	28				░	Medium dense brownish grey silty fine to medium sand binded with clay.
6.00	6.45	0.45	P	11	14	17	31				░	
7.50	7.95	0.45	P	4	5	10	15				░	
10.50	10.95	0.45	P	7	10	13	23				░	
12.50	12.95	0.45	P	100 for 4 cm			>100				▒	12.50m
15.50	15.95	0.45	P	100 for 8 cm			>100				▒	Very dense dark grey fine to medium sand with gravels traces of weathered rock fragments.
18.50	18.95	0.45	P	100 for 3 cm			>100				▒	
20.00	20.45	0.45	P	100 for 8 cm			>100				▒	
20.45	(Termination Depth)											

U-Undisturbed Sample **D**-Disturbed Sample **P**-Standard Penetration Test **CS**-Core Sample **RQD**-Rock Quality Designation

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v ($cm^{2/}kg$)
BH- GT 81	P	3.00	8	-	83.0	17.00*			1.874		Non-Plastic				SP	DS		25.0	2.66		
	P	6.00	24	-	85.6	14.40*			1.881		Non-Plastic				SP	DS		29.0	2.66		
	P	10.50	40	1.0	16.1	54.2	28.7				39.1	20.0	19.1	18.0	CI				2.66		
	P	13.50	5	-	3.4	58.6	38.0				49.3	25.1	24.2	20.0	CI				2.61		
	P	16.50	20	2.3	19.2	52.2	26.3				38.2	19.6	18.6	18.0	CI				2.65		
	P	28.50	14	4.1	20.6	51.5	23.8				36.5	18.8	17.7	16.0	CI				2.65		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH- GT 82	P	3.00	14	-	79.5	20.50*			1.876		Non-Plastic				SP	DS		26.0	2.66		
	P	6.00	3	-	2.9	58.2	38.9				48.6	24.9	23.7	22.0	CI				2.61		
	P	10.50	31	3.3	19.4	53.2	24.1				36.7	18.8	17.9	18.0	CI				2.66		
	P	16.50	16	4.0	21.5	52.0	22.5				35.1	16.1	19.0	16.0	CI				2.65		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^{2})	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^{2})	m_v (cm$^{2/}$kg)
BH- GT 83	P	1.50	16	-	84.3	15.70*			1.879		Non-Plastic				SM	DS		27.0	2.66		
	U	5.00	-	-	3.2	58.4	38.4	26.7	1.741	1.374	50.7	26.0	24.7	22.0	CI	UU	0.21	3.0	2.60	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0405 0.0345 0.0247 0.0169 0.0113
	P	10.50	1	-	3.9	58.0	38.1				49.0	25.0	24.0	21.0	CI				2.61		
	U	14.50	-	-	5.1	57.1	37.8	23.0	1.763	1.433	48.2	24.7	23.5	21.0	CI	UU	0.28	4.0	2.61	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0344 0.0282 0.0220 0.0155 0.0107
	P	16.50	>100	14.7	80.6	4.70*			1.919		Non-Plastic				SP	DS		36.0	2.68		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm$^{2/}$kg)
BH- GT 84	P	3.00	12	-	81.7	18.30*			1.876		Non-Plastic				SP	DS		26.0	2.66		
	P	6.00	3	-	3.9	57.6	38.5				49.6	25.3	24.3	21.0	CI				2.61		
	P	10.50	31	17.3	78.3	4.40*			1.931		Non-Plastic				SP	DS		36.0	2.66		
	P	16.50	16	12.5	83.5	4.00*			1.927		Non-Plastic				SP	DS		35.0	2.66		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm$^{2/}$kg)
BH- GT 85	P	1.50	13	-	79.9	20.10*			1.872		Non-Plastic				SP	DS		25.0	2.66		
	P	4.50	15	-	82.7	17.30*			1.877		Non-Plastic				SP	DS		27.0	2.66		
	P	10.50	13	2.7	16.2	60.3	20.8				31.4	16.4	15.0	13.0	CL				2.64		
	P	16.50	76	4.3	19.1	59.6	17.0				28.5	14.7	13.8	12.0	CL				2.66		
	P	22.50	32	3.1	17.6	61.0	18.3				29.3	15.1	14.2	12.0	CL				2.65		
	P	28.50	100	15.6	80.4	4.00*			1.930		Non-Plastic				SP	DS		36.0	2.68		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm$^{2/}$kg)
BH- GT 86	P	1.50	33	-	76.6	23.40*			1.884		Non-Plastic				SM	DS		30.0	2.66		
	P	4.50	16	-	80.4	19.60*			1.880		Non-Plastic				SM	DS		28.0	2.66		
	P	7.50	31	2.0	15.7	56.6	25.7				37.2	19.1	18.1	16.0	CI				2.66		
	P	13.50	20	3.1	18.2	55.5	23.2				36.0	18.4	17.6	15.0	CI				2.65		
	P	19.50	51	4.5	20.4	53.2	21.9				35.1	17.8	17.3	14.0	CI				2.66		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm$^{2/}$kg)
BH- GT 87	P	1.50	1	-	71.9	28.10*			1.884		Non-Plastic				SM	DS		22.0	2.66		
	P	4.50	5	-	75.6	24.40*			1.880		Non-Plastic				SM	DS		23.0	2.66		
	P	7.50	95	10.5	85.7	3.80*			1.880		Non-Plastic				SM	DS		35.0	2.66		
	P	19.50	8	2.7	17.4	56.5	23.4				37.3	19.1	18.2	16.0	CI				2.65		
	P	25.50	21	3.3	19.1	54.8	22.8				36.8	18.8	18.0	16.0	CI				2.65		
	P	31.50	36	4.0	21.6	55.1	19.3				30.1	15.7	14.4	14.0	CL				2.66		
	P	37.50	44	5.2	24.3	53.7	16.8				27.4	14.2	13.2	12.0	CL				2.66		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm$^{2/}$kg)
BH- GT 88	P	1.50	6	-	74.8	25.20*			1.875		Non-Plastic				SM	DS		23.0	2.66		
	P	4.50	13	-	75.5	24.50*			1.885		Non-Plastic				SM	DS		26.0	2.66		
	P	7.50	>100	8.5	25.1	50.6	15.8				26.4	13.9	12.5	11.0	CL				2.67		
	P	14.50	8	3.4	18.6	53.7	24.3				37.3	19.1	18.2	15.0	CI				2.65		
	P	22.50	21	4.6	19.3	52.5	23.6				36.8	18.8	18.0	15.0	CI				2.65		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^{2}/kg)
BH- GT 89	U	3.00	-	-	20.3	57.6	22.1	17.6	1.909	1.623	31.4	16.1	15.3	12.0	CI	UU	0.54	10.0	2.66	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0229 0.0173 0.0122 0.0079 0.0052
	P	4.50	>100	7.6	80.1	12.30*			1.915		Non-Plastic				SM	DS		35.0	2.66		
	P	6.00	40	2.5	15.9	57.2	24.4				35.2	18.0	17.2	12.0	CI				2.66		
	P	10.50	>100	11.6	83.8	4.60*			1.924		Non-Plastic				SP	DS		36.0	2.68		
	P	16.50	>100	15.5	80.6	3.90*			1.931		Non-Plastic				SP	DS		36.0	2.68		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm$^{2/}$kg)
BH- GT 90	P	1.50	5	6.1	18.5	53.1	22.3				33.6	17.4	16.2	13.0	CL				2.64		
	P	3.00	16	5.4	20.8	52.2	21.6				31.2	16.1	15.1	12.0	CL				2.65		
	P	4.50	29	7.5	23.6	51.0	17.9				28.5	14.8	13.7	11.0	CL				2.65		
	P	6.00	25	8.3	25.3	50.7	15.7				26.4	13.9	12.5	11.0	CL				2.65		
	P	7.50	38	-	95.6	4.40*			1.905		Non-Plastic				SP	DS		32.0	2.66		
	P	10.50	44	-	96.7	3.30*			1.910		Non-Plastic				SP	DS		34.0	2.66		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH- GT 91	P	1.50	7	-	91.7	8.30*			1.881		Non-Plastic				SM-SP	DS		28.0	2.64		
	P	4.50	14	-	94.5	5.50*			1.887		Non-Plastic				SM-SP	DS		30.0	2.65		
	P	7.50	15	-	95.8	4.20*			1.892		Non-Plastic				SP	DS		32.0	2.65		
	P	10.50	41	2.3	16.2	55.1	26.4				36.2	18.1	18.1	14.0	CI				2.65		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH- GT 92	P	1.50	13	-	85.3	14.70*			1.885		Non-Plastic				SM	DS		30.0	2.64		
	P	4.50	15	-	87.2	12.80*			1.889		Non-Plastic				SM	DS		31.0	2.65		
	P	7.50	15	-	89.1	10.90*			1.892		Non-Plastic				SM-SP	DS		31.0	2.65		
	P	13.50	31	-	92.5	7.50*			1.896		Non-Plastic				SM-SP	DS		33.0	2.65		
	P	19.50	32	-	95.4	4.60*			1.903		Non-Plastic				SP	DS		33.0	2.65		
	P	25.50	>100	-	96.0	4.00*			1.909		Non-Plastic				SP	DS		35.0	2.66		
	P	31.50	37	6.0	22.3	59.5	12.2				23.4	12.1	11.3	11.0	CL				2.66		
	P	37.50	>100	13.7	81.3	5.00*			1.921		Non-Plastic				SP	DS		36.0	2.67		
	P	42.50	>100	15.1	80.6	4.30*			1.927		Non-Plastic				SP	DS		36.0	2.68		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH- GT 93	P	3.00	8	-	83.7	16.30*			1.876		Non-Plastic				SM	DS		26.0	2.64		
	P	6.00	28	-	87.2	12.80*			1.885		Non-Plastic				SM	DS		31.0	2.65		
	P	10.50	20	-	89.1	10.90*			1.880		Non-Plastic				SM-SP	DS		30.0	2.65		
	P	16.50	13	2.1	21.6	56.3	20.0				29.6	15.7	13.9	13.0	CL				2.65		
	P	22.50	21	2.9	25.2	55.1	16.8				26.5	13.8	12.7	12.0	CL				2.65		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm$^{2/}$kg)
BH- GT 94	P	3.00	19	-	14.4	57.3	28.3				39.8	20.5	19.3	18.0	CI				2.66		
	P	6.00	32	2.5	16.3	55.1	26.1				38.1	19.7	18.4	17.0	CI				2.66		
	U	10.50	-	3.1	15.6	54.2	27.1	19.9	1.902	1.586	36.4	18.9	17.5	15.0	CI	UU	0.79	10.0	2.67	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0201 0.0172 0.0132 0.0094 0.0063
	P	22.50	28	5.0	19.5	53.7	21.8				32.2	16.8	15.4	13.0	CL				2.68		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH- GT 95	P	3.00	9	-	95.7	4.30*			1.871		Non-Plastic				SP	DS		25.0	2.65		
	P	6.00	11	-	96.4	3.60*			1.880		Non-Plastic				SP	DS		28.0	2.65		
	U	10.50	-	2.1	16.1	58.0	23.8	18.3	1.914	1.618	35.3	18.1	17.2	16.0	CI	UU	0.86	10.0	2.67	0.25-0.5	0.0190
																				0.5-1.0	0.0155
																				1.0-2.0	0.0114
																				2.0-4.0	0.0082
																				4.0-8.0	0.0057
	P	16.50	30	3.5	18.0	56.3	22.2				33.2	17.0	16.2	14.0	CL				2.67		
	P	19.50	>100	10.4	72.7	16.90*			1.926		Non-Plastic				SP	DS		35.0	2.68		
	P	25.50	>100	12.5	75.2	12.30*			1.930		Non-Plastic				SP	DS		36.0	2.68		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH- GT 96	U	3.00	-	1.4	15.4	56.8	26.4	21.5	1.862	1.533	36.1	18.7	17.4	16.0	CI	UU	0.38	8.0	2.64	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0277 0.0234 0.0158 0.0103 0.0069
	P	6.00	>100	7.9	19.4	57.6	15.1				24.7	13.1	11.6	13.0	CL				2.66		
	P	10.50	>100	11.0	22.5	54.3	12.2				23.3	12.0	11.3	12.0	CL				2.66		
	P	16.50	>100	12.1	25.3	52.1	10.5				21.4	11.2	10.2	10.0	CL				2.66		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm$^{2/}$kg)
BH- GT 97	U	2.00	-	-	5.6	60.4	34.0	20.1	1.894	1.577	45.2	23.1	22.1	20.0	CI	UU	0.56	6.0	2.64	0.25-0.5	0.0225
																				0.5-1.0	0.0203
																				1.0-2.0	0.0143
																				2.0-4.0	0.0101
																				4.0-8.0	0.0068
	U	4.50	-	-	6.5	61.7	31.8	21.6	1.881	1.547	42.3	22.7	19.6	20.0	CI	UU	0.45	6.0	2.64	0.25-0.5	0.0279
																				0.5-1.0	0.0230
																				1.0-2.0	0.0159
																				2.0-4.0	0.0110
																				4.0-8.0	0.0071
	U	7.50	-	-	7.3	62.5	30.2	22.2	1.870	1.530	40.5	21.4	19.1	19.0	CI	UU	0.41	6.0	2.64	0.25-0.5	0.0290
																				0.5-1.0	0.0236
																				1.0-2.0	0.0165
																				2.0-4.0	0.0113
																				4.0-8.0	0.0072
	P	13.50	15	-	85.6	14.40*			1.880		Non-Plastic				SP	DS		29.0	2.66		
	P	20.00	>100	9.0	78.1	12.90*			1.920		Non-Plastic				SP	DS		35.0	2.68		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m$_v$ (cm^{2}/kg)
BH- GT 98	P	1.50	17	-	96.0	4.00*			1.884		Non-Plastic				SP	DS		30.0	2.64		
	P	4.50	18	-	97.1	2.90*			1.888		Non-Plastic				SP	DS		31.0	2.64		
	U	6.00	-	1.3	13.5	59.8	25.4	23.3	1.814	1.471	36.7	18.8	17.9	16.0	CI	UU	0.27	8.0	2.64	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0377 0.0321 0.0226 0.0164 0.0111
	P	7.50	6	0.5	14.0	60.6	24.9				36.2	18.5	17.7	16.0	CI				2.65		
	U	9.00	-	2.1	15.4	58.5	24.0	20.6	1.833	1.520	35.4	18.0	17.4	15.0	CI	UU	0.33	9.0	2.66	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0308 0.0243 0.0190 0.0131 0.0091
	U	13.50	-	2.8	17.3	56.8	23.1	18.0	1.878	1.592	34.9	17.7	17.2	14.0	CI	UU	0.51	10.0	2.66	0.25-0.5 0.5-1.0 1.0-2.0 2.0-4.0 4.0-8.0	0.0248 0.0204 0.0149 0.0096 0.0064

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST ON SOIL

Bore Hole No.	Type	Depth (m)	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	IS Classification	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH- GT 99	P	1.50	19	1.4	17.5	54.2	26.9				38.1	19.8	18.3	18.0	CI				2.65		
	P	4.50	28	-	84.1	15.90*			1.885		Non-Plastic				SM	DS		30.0	2.65		
	P	7.50	15	-	83.6	16.40*			1.881		Non-Plastic				SM-SP	DS		29.0	2.65		
	P	12.50	>100	11.7	70.6	17.70*			1.925		Non-Plastic				SP	DS		36.0	2.68		
	P	18.50	>100	14.0	72.8	13.20*			1.932		Non-Plastic				SP	DS		36.0	2.68		

* Silt & Clay

DS: Direct Shear Test
UC: Unconfined Compression Test
UU: Unconsolidation Undrained Test

LABORATORY TEST RESULTS OF ROCK SAMPLES

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No.	**Depth** (m)	**Unit Weight** (gm/cc)	**Water Absorption** (%)	**Crushing Strength** *(kg/cm^2)*	**Specific Gravity** (%)	**Point Load** *(kg/cm^2)*
GT- 81	34.29	2.70	0.76	161.0	2.72	6.7
GT- 81	35.29	2.72	0.62	172.0	2.73	7.1
GT- 81	36.29	2.68	1.04	140.0	2.70	5.8
GT- 81	37.29	2.70	0.90	155.0	2.71	6.4
GT- 81	38.29	2.69	0.87	149.0	2.71	6.2
GT- 82	20.60	2.71	0.71	167.0	2.72	6.9
GT- 82	21.60	2.68	1.13	138.0	2.70	5.7
GT- 82	22.60	2.72	0.65	189.0	2.73	7.8
GT- 82	23.60	2.69	1.09	175.0	2.72	7.2
GT- 82	24.60	2.75	0.57	232.0	2.73	9.6

LABORATORY TEST RESULTS OF ROCK SAMPLES

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No.	**Depth** (m)	**Unit Weight** (gm/cc)	**Water Absorption** (%)	**Crushing Strength** *(kg/cm^2)*	**Specific Gravity** (%)	**Point Load** *(kg/cm^2)*
GT- 83	17.50	2.70	0.67	141.0	2.71	5.8.2
GT- 83	18.50	2.72	0.98	170.0	2.73	7.0
GT- 83	19.50	2.68	1.19	132.0	2.71	5.5
GT- 83	20.50	2.69	1.07	146.0	2.71	6.0
GT- 83	21.50	2.70	1.16	156.0	2.72	6.5
GT- 84	20.50	2.69	1.08	173.0	2.71	7.2
GT- 84	21.50	2.68	1.00	165.0	2.71	6.8
GT- 84	22.50	2.65	1.39	124.0	2.70	5.1
GT- 85	29.80	2.71	0.67	178.0	2.71	7.4
GT- 85	30.80	2.72	0.79	183.0	2.72	7.6
GT- 85	31.80	2.71	0.81	174.0	2.71	7.3

LABORATORY TEST RESULTS OF ROCK SAMPLES

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No.	**Depth** (m)	**Unit Weight** (gm/cc)	**Water Absorption** (%)	**Crushing Strength** *(kg/cm^2)*	**Specific Gravity** (%)	**Point Load** *(kg/cm^2)*
GT- 85	32.80	2.71	1.08	177.0	2.72	7.3
GT- 85	33.80	2.72	0.89	186.0	2.72	7.8
GT- 86	22.60	2.70	1.16	165.0	2.71	6.8
GT- 86	23.60	2.69	0.94	157.0	2.71	6.5
GT- 86	24.60	2.68	1.23	141.0	2.70	5.8
GT- 86	25.60	2.71	0.99	188.0	2.72	7.8
GT- 86	26.60	2.73	0.71	214.0	2.73	8.9
GT- 87	38.00	2.73	0.83	225.0	2.73	9.3
GT- 87	39.50	2.74	0.64	241.0	2.73	10.0
GT- 87	41.00	2.73	0.55	232.0	2.73	9.7
GT- 87	42.00	2.70	1.05	152.0	2.71	6.3

LABORATORY TEST RESULTS OF ROCK SAMPLES

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No.	**Depth** (m)	**Unit Weight** (gm/cc)	**Water Absorption** (%)	**Crushing Strength** *(kg/cm^2)*	**Specific Gravity** (%)	**Point Load** *(kg/cm^2)*
GT- 88	27.00	2.68	1.21	148.0	2.71	6.1
GT- 88	28.50	2.67	1.33	139.0	2.70	5.7
GT- 88	30.00	2.68	1.17	142.0	2.71	5.9
GT- 88	31.00	2.68	1.29	153.0	2.71	6.3
GT- 90	11.00	2.69	1.06	151.0	2.71	6.2
GT- 90	12.50	2.72	0.83	199.0	2.73	8.2
GT- 90	14.00	2.71	0.94	180.0	2.72	7.5
GT- 90	15.00	2.71	0.91	183.0	2.71	5.7

LABORATORY TEST RESULTS OF ROCK SAMPLES

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No.	**Depth** (m)	**Unit Weight** (gm/cc)	**Water Absorption** (%)	**Crushing Strength** *(kg/cm^2)*	**Specific Gravity** (%)	**Point Load** *(kg/cm^2)*
GT- 91	16.00	2.68	1.22	139.0	2.70	5.7
GT- 91	17.00	2.68	1.19	136.0	2.70	5.6
GT- 91	18.50	2.68	1.27	140.0	2.71	5.8
GT- 91	20.00	2.69	1.00	154.0	2.71	6.2
GT- 93	23.50	2.68	1.20	151.0	2.71	6.3
GT- 93	25.00	2.67	1.36	137.0	2.70	5.7
GT- 93	26.50	2.70	0.81	183.0	2.71	7.6
GT- 93	27.50	2.68	1.14	143.0	2.70	5.9
GT- 94	27.00	2.69	1.33	169.0	2.71	7.0
GT- 94	28.50	2.65	1.47	127.0	2.69	5.3
GT- 94	30.00	2.71	0.60	202.0	2.72	8.4

LABORATORY TEST RESULTS OF ROCK SAMPLES

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Bore Hole No.	**Depth** (m)	**Unit Weight** (gm/cc)	**Water Absorption** (%)	**Crushing Strength** *(kg/cm^2)*	**Specific Gravity** (%)	**Point Load** *(kg/cm^2)*
GT- 94	31.00	2.68	1.08	157.0	2.70	6.5
GT- 97	21.00	2.64	1.41	125.0	2.69	5.2
GT- 97	22.00	2.68	1.05	156.0	2.70	6.5
GT- 97	23.50	2.71	0.74	199.0	2.72	8.3
GT- 97	24.50	2.72	0.59	214.0	2.73	8.9
GT- 97	26.00	2.71	0.66	206.0	2.72	8.5
GT- 98	16.75	2.68	1.35	147.0	2.70	6.1
GT- 98	17.75	2.72	0.79	204.0	2.73	8.5
GT- 98	19.75	2.71	0.87	189.0	2.72	7.9
GT- 98	20.75	2.71	0.92	183.0	2.71	7.6

CHEMICAL TEST RESULTS ON SOIL AND GROUND WATER SAMPALE

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Chemical Tests on Soil samples					Chemical Tests on Water samples		
Borehole No.	**Depth (m)**	**pH Value**	**Chloride(%)**	**Sulphate (%)**	**pH Value**	**Chloride (mg/litre)**	**Sulphate (mg/litre)**
GT-81	3.00	6.7	0.02	0.07	7.2	58.40	243.00
	10.50	6.6	0.02	0.08			
	25.50	6.5	0.03	0.06			
GT-82	1.50	6.6	0.03	0.07	7.1	62.70	266.00
	6.00	6.8	0.02	0.08			
	13.50	6.6	0.02	0.06			
GT-83	1.50	6.7	0.02	0.05	6.9	59.60	271.00
	7.50	6.8	0.01	0.06			
	16.50	6.6	0.03	0.05			
GT-84	1.50	6.8	0.02	0.06	7.0	55.20	255.00
	6.00	6.7	0.02	0.07			
	16.50	6.6	0.01	0.08			
GT-85	3.00	6.7	0.02	0.06	7.2	57.70	260.00
	16.50	6.5	0.01	0.05			
	28.50	6.6	0.03	0.06			
GT-86	4.50	6.5	0.02	0.06	7.3	64.70	265.00
	10.50	6.6	0.03	0.07			
	19.50	6.7	0.02	0.08			
GT-86A	3.00	6.7	0.02	0.08	7.0	83.50	274.00
	6.00	6.8	0.03	0.07			
	16.50	6.7	0.04	0.06			
GT-87	7.50	6.5	0.03	0.07	7.0	63.90	248.00
	22.50	6.8	0.02	0.06			
	34.50	6.6	0.03	0.08			
GT-87A	4.50	6.6	0.03	0.07	7.2	81.10	264.00
	13.50	6.7	0.02	0.06			
	25.50	6.8	0.03	0.07			
GT-88	4.50	6.5	0.02	0.07	6.9	71.10	261.00
	7.50	6.7	0.03	0.06			
	19.50	6.6	0.01	0.06			
GT-89	3.00	6.8	0.03	0.08	7.1	61.90	267.00
	4.50	6.8	0.02	0.07			
	7.50	6.7	0.03	0.08			
GT-90	4.50	6.8	0.02	0.05	7.0	63.90	259.00
	7.50	6.7	0.02	0.06			

CHEMICAL TEST RESULTS ON SOIL AND GROUND WATER SAMPALE

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Chemical Tests on Soil samples					Chemical Tests on Water samples		
Borehole No.	**Depth (m)**	**pH Value**	**Chloride(%)**	**Sulphate (%)**	**pH Value**	**Chloride (mg/litre)**	**Sulphate (mg/litre)**
GT-91	1.50	6.8	0.03	0.06	7.2	67.30	261.00
	10.50	6.6	0.02	0.08			
GT-92	4.50	6.7	0.04	0.07	7.3	82.50	256.00
	22.50	6.8	0.02	0.06			
	31.50	6.7	0.03	0.07			
	39.50	6.6	0.02	0.06			
GT-93	3.00	6.8	0.03	0.07	7.3	83.90	260.00
	13.50	6.8	0.02	0.06			
	19.50	6.6	0.02	0.05			
GT-94	4.50	6.9	0.04	0.07	7.1	75.70	263.00
	16.50	6.8	0.03	0.07			
GT-95	3.00	6.6	0.03	0.07	7.2	80.80	258.00
	10.50	6.8	0.03	0.06			
	19.50	6.7	0.03	0.08			
GT-96	3.00	6.7	0.04	0.07	7.1	69.40	272.00
	6.00	6.8	0.02	0.06			
	13.50	6.6	0.03	0.05			
GT-97	2.00	6.5	0.03	0.07	7.0	65.50	271.00
	13.50	6.8	0.02	0.06			
	20.00	6.7	0.03	0.07			
GT-98	3.00	6.8	0.02	0.08	7.0	71.60	267.00
	6.00	6.9	0.03	0.06			
	9.00	6.8	0.01	0.05			
GT-99	1.50	6.7	0.02	0.07	7.2	65.10	259.00
	7.50	6.9	0.03	0.06			
	15.50	6.7	0.02	0.05			

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Thalassery - Champad - Panoor,Kodiyeri
Chainage 424+253
Bore Hole No: GT 100A
R.L. of BH (m) 7.800
Termination Depth of Borehole : 15.50m

Date of starting:11.12.19
Date of completion:13.12.19
Period of Lab.Test :23.02.20 to 13.3.20

Static Ground Water Table:+5.50m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 11°46'17"N 75°32'15"E

Notation			
DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e$_0$
0.00								Top surface soil followed by medium dense,reddish brown silty fine to medium sand with little gravels.Clay pockets observed at some places.	0.00	7.80																			
0.50																													
1.00																													
1.50	DS	1.50-1.95	1.50	18							SM	4	80	16						Non Plastic							-		
2.00																													
2.50																													
3.00	DS	3.0-3.45	3.00	29							SM	0	74	26						Non Plastic									
3.50									to	to																			
4.00																													
4.50	DS	4.50-4.95	4.50	21							SM	0	71	29						Non Plastic									
5.00																													
5.50																													
6.00	UDS	6.0-6.45									SM	0	63	37		10.00	1.78	1.62	2.65	Non Plastic				DT	0.00	32.0			
6.50																													
7.00									7.50	0.30																			
7.50	DS	7.50-7.95	7.50	38				Completely weathered rock converted to dense brownish yellow residual soil consisting sand and kankar with some fines.	7.50	0.30	SM	1	72	27						Non Plastic									
8.00																													
8.50																													
9.00									to	to																			
9.50																													
10.00									10.50	-2.70																			
10.50	CS	10.50-12.0	10.50	Refusal	90.6	80.7	v v v	Slightly weathered to fresh ,dark grey,fine grained,moderately strong & hard Quartzite Gneiss.	10.50	-2.70	Metamorphic Rock																		
11.00							v v v																						
11.50							v v v																						
12.00	CS	12.0-13.50			93.3	92.6	v v v																						
12.50							v v v																						
13.00							v v v		to	to																			
13.50	CS	13.50-14.50			100	98.0	v v v																						
14.00							v v v																						
14.50	CS	14.50-15.50			86.0	85.0	v v v																						
15.50							v v v		15.50	-7.70																			

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
12.0-13.50	2.79	0.50	2.78	235.00	11.00
13.50-14.50	2.85	0.30	2.81	255.00	11.00
14.50-15.50	2.81	0.30	2.81	244.00	10.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Notation			
DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Location: Near Pullyode East L.P School
Chainage 428+215
Bore Hole No: GT 101A
R.L. of BH (m) 9.100
Termination Depth of Borehole : 22.00m

Date of starting:15.12.19
Date of completion:21.12.19
Period of Lab.Tets :13.02.20 to 25.02.20

Static Ground Water Table:+8.30m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate N:11°48'03" ,E:75°31'02"

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e$_0$
0.00							▨	Top surface soil followed by medium stiff,dark grey silty clay with some sand and kankar.	0.00	9.10																			
0.50							▨																						
1.00							▨																						
1.50	DS	1.50-1.95	1.50	7			▨				CI	0	5	75	20					39	20	19					-		
2.00							▨																						
2.50							▨																						
3.00	UDS	(UDS slipped)					▨		to	to																			
3.50	DS	3.50-3.95	3.50	9			▨				CI	0	14	66	20	28.0	1.90	1.48	2.66	41	20	21	18		0.55	3.0		0.22	0.79
4.00							▨										(Suggested)									(Suggested)			
4.50	DS	4.50-4.95	4.50	11			▨				CI	0	16	68	16					36	18	18							
5.00							▨																						
5.50							▨		6.00	3.10																			
6.00	DS	6.0-6.45	6.00	5			⁙	Very loose,reddish brown silty fine to medium sand.	6.00	3.10	SM	0	82	← 18 →							Non Plastic								
6.50							⁙		to	to																			
7.00							⁙		7.50	1.60																			
7.50	CS	7.50-9.0	7.50	12 cm for 100 blows	10.0	0.0	v v v	Highly weathered,disintegrated,thinly bedded,fine grained,mica laminated Schist.	7.50	1.60	Metamorphic Rock																		
8.00							v v v																						
8.50							v v v																						
9.00	CS	9.0-10.0			15.0	0.0	v v v																						
9.50							v v v																						
10.00	CS	10.0-11.0			11.0	0.0	v v v																						
10.50							v v v																						
11.00	CS	11.0-12.0			25.0	0.0	v v v		to	to																			
11.50							v v v																						
12.00	CS	12.0-13.0			20.0	0.0	v v v																						
12.50							v v v																						
13.00	CS	13.0-14.0			89.0	12.0	v v v																						
13.50							v v v																						
14.00	CS	14.0-15.0			90.0	0.0	v v v																						
14.50							v v v																						
15.00	CS	15.0-16.0			83.0	23.0	v v v		17.00	-7.90																			

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Near Pullyode East L.P School
Chainage 428+215
Bore Hole No: GT 101A
R.L. of BH (m) 9.100
Termination Depth of Borehole : 22.00m

Date of starting:15.12.19
Date of completion:21.12.19
Period of Lab.Tets :13.02.20 to 25.02.20

Static Ground Water Table:+8.30m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate N:11°48'03" ,E:75°31'02"

Notation
DS :Disturbed Sample
UDS :Undisturbed sample
SL :Slipped
TS :Triaxial test(UU)
W.A. :Water absorption
CS:Rock core sample
RQD:Rock Quality Designation
CR:Core Recovery
DT : Direct Shear test
Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
15.50							v v v																						
16.00	CS	16.0-17.0			70.0	0.0	v v v	-do-																					
16.50							v v v																						
17.00	CS	17.0-18.50			93.0	81.3	v v v		17.00	-7.90	Metamorphic Rock																		
17.50							v v v																						
18.00							v v v																						
18.50	CS	18.50-20.0			63.3	50.6	v v v																						
19.00							v v v	Weathered ,dark grey,fine grained,moderately strong & hard Quartzite Gneiss.																					
19.50							v v v		to	to																			
20.00	CS	20.0-21.0			72.0	25.0	v v v																						
20.50							v v v																						
21.00	CS	21.0-22.0			80.0	30.0	v v v																						
21.50							v v v																						
22.00							v v v		22.00	-12.90																			
22.50																													
23.00																													
23.50																													
24.00																													
24.50																													
25.00																													
25.50																													
26.00																													
26.50																													
27.00																													
27.50																													
28.00																													
28.50																													
29.00																													
29.50																													
30.00																													

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
13.0-14.0	2.65	1.60	2.66	102.00	3.00
15.0-16.0	2.66	2.00	2.65	89.00	4.00
17.0-18.50	2.78	0.50	2.80	245.00	12.00
21.0-22.0	2.68	0.60	2.70	220.00	10.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Approach of Anjarakandy River
Chainage 432+662
Bore Hole No: GT 102
R.L. of BH (m) 5.900
Termination Depth of Borehole : 24.00m

Date of starting:13.12.19
Date of completion:16.12.19
Period of Lab.Tets :13.02.20 to 25.02.20

Static Ground Water Table:+4.70m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 11°49'09.9"N ,75°29'04.3"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00							▨	Top surface soil followed by soft,brownish grey silty clay with some sand and kankar.	0.00	5.90																			
0.50	DS	0.50																											
1.00																													
1.50	DS	1.50-1.95	1.50	3							CI	0	18	56	26					44	20	24							
2.00																													
2.50									to	to																			
3.00	UDS	3.0-3.45									CI	0	20	50	30	31.0	1.83	1.40	2.69	45	21	24	12	TS	0.25	2.0	0.55	0.26	0.92
3.50																													
4.00																													
4.50	DS	4.50-4.95	4.50	4																									
5.00																													
5.50									6.00	-0.10																			
6.00	UDS	(UDS slipped due to soft soil)					▨	Very soft/soft, dark grey silty clay .Decomposed organic matter observed intermittently.	6.00	-0.10																			
6.50	DS	6.50-6.95	6.50	3																									
7.00																													
7.50	DS	7.50-7.95	7.50	4							OI	0	2	77	21	40.0	1.68	1.20	2.58	46	36	10	6		0.15	0.0		0.32	1.15
8.00																	(Suggested)									(Suggested)			
8.50																													
9.00									to	to																			
9.50																													
10.00																													
10.50	UDS	(UDS slipped due to soft soil)																											
11.00	DS	11.0-11.45	11.00	4							OI	0	2	73	25			0.00		45	38	7							
11.50																													
12.00									12.50	-6.60																			
12.50	CS	12.50-14.0	12.50	15,100 blows for 4cm	14.0	0.0	v v v	Highly weathered,disintegrated,thinly bedded,fine grained,mica laminated Schist.	12.50	-6.60	Metamorphic Rock																		
13.00							v v v																						
13.50							v v v																						
14.00	CS	14.0-15.50	14.00	100 blows for 3cm	15.0	0.0	v v v		to	to																			
14.50							v v v																						
15.00							v v v		19.00	-13.10																			

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Approach of Anjarakandy River
Chainage 432+662
Bore Hole No: GT 102
R.L. of BH (m) 5.900
Termination Depth of Borehole : 24.00m
Date of starting:13.12.19
Date of completion:16.12.19
Period of Lab.Tets :13.02.20 to 25.02.20
Static Ground Water Table:+4.70m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 11°49'09.9"N ,75°29'04.3"E

Notation

DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT Depth (m)	SPT Observed"N" Value	Rock Sample CR (%)	Rock Sample RQD (%)	Log Symbol	Description of Strata	Strata Depth (m) From / To	RL	IS classification	Grain Size Distribution % Gravel	% Sand	% Silt	% clay	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits LL (%)	PL (%)	PI(%)	Ws (%)	Shearing Strength characteristic Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Consolidation Characteristic Cc	e_0
15.50	CS	15.50-17.0			20.0	0.0	v v v	-do-			Metamorphic Rock																		
16.00							v v v																						
16.50							v v v																						
17.00	CS	17.0-18.0			25.0	0.0	v v v																						
17.50							v v v																						
18.00	CS	18.0-19.0			88.0	0.0	v v v																						
18.50							v v v																						
19.00	CS	19.0-20.5			69.3	56.6	v v v	Fresh ,dark grey,fine grained,moderately strong & hard Quartzite Gneiss.	19.00	-13.10																			
19.50							v v v																						
20.00							v v v																						
20.50	CS	20.50-22.0			86.6	74.0	v v v																						
21.00							v v v																						
21.50							v v v		to	to																			
22.00	CS	22.0-23.0			91.0	76.0	v v v																						
22.50							v v v																						
23.00	CS	23.0-24.0			86.0	82.0	v v v																						
23.50							v v v																						
24.00							v v v		24.00	-18.10																			
24.50																													
25.00																													
25.50																													
26.00																													
26.50																													
27.00																													
27.50																													
28.00																													
28.50																													
29.00																													
29.50																													
30.00																													

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
19.0-20.5	2.78	1.00	2.80	245.00	9.00
20.50-22.0	2.80	0.60	2.75	265.00	12.00
23.0-24.0	2.75	1.20	2.76	248.00	11.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Kadachira Rd,Kadachira
Chainage 438+270
Bore Hole No: GT 103A
R.L. of BH (m) 3.200
Termination Depth of Borehole : 23.00m

Date of starting:18.12.19
Date of completion:23.12.19
Period of Lab.Tets :13.02.20 to 25.02.20

Static Ground Water Table:+2.70m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 11°50'24"N ,75°26'14"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00								Top surface soil followed by stiff,yellowish brown silty clay with sand and gravels.	0.00	3.20																			
0.50																													
1.00																													
1.50	DS	1.50-1.95	1.50	16							CI	12	26	42	20					39	19	20					-		
2.00																													
2.50									to	to																			
3.00	UDS	3.0-3.45									CI	2	16	53	29	28.0	1.93	1.51	2.68	40	20	20	15	TS	0.50	5.0	1.10	0.19	0.78
3.50																													
4.00																													
4.50	DS	4.50-4.95	4.50	8																									
5.00									5.50	-2.30																			
5.50								Very dense,light brown fine sand with traces of fines.	5.50	-2.30																			
6.00	DS	6.0-6.45	6.00	100					to	to	SP	0	97	← 3 →						Non Plastic									
6.50									6.50	-3.30																			
7.00								Stiff,grey silty clay with some fine sand.	6.50	-3.30																			
7.50	UDS	7.50-7.95									CI	0	13	64	23	25.0	1.91	1.53	2.67	41	20	21	16	TS	0.60	4.0	1.30	0.20	0.75
8.00									to	to																			
8.50																													
9.00																													
9.50									10.00	-6.80																			
10.00								Medium dense,grey micaceous silty fine to medium sand.	10.00	-6.80																			
10.50	DS	10.50-10.95	10.50	26							SM	4	75	← 21 →						Non Plastic									
11.00																													
11.50																													
12.00																													
12.50									to	to																			
13.00																													
13.50	DS	13.50-13.95	13.50	16							SM	0	72	← 28 →			1.70		2.62	Non Plastic					0.00	31.0			
14.00																	(Suggested)									(Suggested)			
14.50																													
15.00									18.00	-14.80																			

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Kadachira Rd,Kadachira
Chainage 438+270
Bore Hole No: GT 103A
R.L. of BH (m) 3.200
Termination Depth of Borehole : 23.00m

Date of starting:18.12.19
Date of completion:23.12.19
Period of Lab.Tets :13.02.20 to 25.02.20

Static Ground Water Table:+2.70m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 11°50'24"N ,75°26'14"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
15.50							▨																						
16.00							▨																						
16.50	DS	16.50-16.95	16.50	34			▨	-do-			SM	0	68	← 32 →						Non Plastic									
17.00							▨																						
17.50							▨																						
18.00	CS	18.0-19.0	18.00	Refusal	74.0	72.0	v v	Moderately weathered to fresh,dark grey,fine grained,moderately strong & hard Quartzite Gneiss.	18.00	-14.80	Metamorphic Rock																		
18.50							v v																						
19.00	CS	19.0-20.0			87.0	78.0	v v																						
19.50							v v																						
20.00	CS	20.0-21.50			84.0	73.0	v v																						
20.50							v v		to	to																			
21.00							v v																						
21.50	CS	21.50-23.0			88.0	67.0	v v																						
22.00							v v																						
22.50							v v																						
23.00							v v		23.00	-19.80																			
23.50																													
24.00																													
24.50																													
25.00																													
25.50																													
26.00																													
26.50																													
27.00																													
27.50																													
28.00																													
28.50																													
29.00																													
29.50																													
30.00																													

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
18.0-19.0	2.82	0.60	2.85	256.00	11.00
20.0-21.50	2.80	0.50	2.84	298.00	13.00
21.50-23.0	2.75	1.00	2.78	245.00	11.00

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: NH 47-Elayavoor
Chainage 442+110
Bore Hole No: GT 104
R.L. of BH (m) 3.000
Termination Depth of Borehole : 27.50m

Date of starting:18.12.19
Date of completion:22.12.19
Period of Lab.Tets :13.02.20 to 25.02.20

Static Ground Water Table:(-)5.10m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 11°51'46.8"N ,75°24'39.2"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00							▦	Top surface followed by vey soft to stiff,reddish brown silty clay.Some moorum observed intermittently.	0.00	3.00																			
0.50	DS	0.50																											
1.00																													
1.50	DS	1.50-1.95	1.50	3																							-		
2.00																													
2.50									to	to																			
3.00	DS	3.0-3.45	3.00	100 blows for 3cm							SC	18	44	28	10					30	18	12							
3.50																													
4.00																													
4.50	DS	4.50-4.95	4.50	13							CL	10	14	60	16	23.0	1.90	1.54	2.70	30	19	11	21		0.60	5.0		0.15	0.75
5.00									5.50	-2.50							(Suggested)									(Suggested)			
5.50							▨	Stiff,grey,silty clay with some sand and gravels.	5.50	-2.50																			
6.00	DS	6.0-6.45	6.00	16							CI	10	36	25	29	25.0	1.95	1.56	2.68	40	20	20	18		0.80	5.0		0.18	0.72
6.50																	(Suggested)									(Suggested)			
7.00									to	to																			
7.50	DS	7.50-7.95	7.50	18							CI	8	32	29	31					39	19	20							
8.00																													
8.50									9.00	-6.00																			
9.00	DS	9.0-9.45	9.00	100 blows for 3cm			○	Part of boulder. Reddish in colour.	9.00	-6.00	GP	85	12	← 3 →						Non Plastic									
9.50																													
10.00																													
10.50	DS	10.50-10.95	10.50	100 blows for 2cm							GP	90	8.00	← 2 →			2.00			Non Plastic					0.00	35.0			
11.00									to	to							(Suggested)									(Suggested)			
11.50																													
12.00	DS	12.0-13.50	12.00	100 blows for 2cm							GP	88	8	← 4 →						Non Plastic									
12.50																													
13.00									13.50	-10.50																			
13.50	DS	13.50-13.95	13.50	105			▩	Completely weathered rock converted to very dense,brownish grey residual soil.	13.50	-10.50	SP	0	97	← 3 →			2.00			Non Plastic					0.00	35.0			
14.00									to	to							(Suggested)									(Suggested)			
14.50																													
15.00									19.50	-16.50																			

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: NH 47-Elayavoor
Chainage 442+110
Bore Hole No: GT 104
R.L. of BH (m) 3.000
Termination Depth of Borehole : 27.50m

Date of starting:18.12.19
Date of completion:22.12.19
Period of Lab.Tets :13.02.20 to 25.02.20

Static Ground Water Table:(-)5.10m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 11°51'46.8"N ,75°24'39.2"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT Depth (m)	SPT Observed"N" Value	Rock Sample CR (%)	Rock Sample RQD (%)	Log Symbol	Description of Strata	Strata Depth (m) From / To	Strata Depth (m) RL	IS classification	Grain Size Distribution % Gravel	% Sand	% Silt	% clay	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits LL (%)	PL (%)	PI(%)	Ws (%)	Shearing Strength characteristic Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Consolidation Characteristic Cc	e_0
15.50								-do-																					
16.00																													
16.50	DS	16.50-16.95	16.50	39,100 blows for 5cm							SM	0	81	← 19 →						Non Plastic									
17.00																													
17.50																													
18.00																													
18.50																													
19.00																													
19.50	CS	19.50-20.50	19.50	Refusal	23.0	0.0	v v	Highly weathered,disintegrated,thinly bedded,fine grained,mica laminated Schist.	19.50	-16.50	Metamorphic Rock																		
20.00							v v																						
20.50	CS	20.50-21.50			85.0	11.0	v v		to	to																			
21.00							v v																						
21.50	CS	21.50-22.50			68.0	10.0	v v																						
22.00							v v		22.50	-19.50																			
22.50	CS	22.50-24.0			98.0	58.6	v v	Fresh ,dark grey,fine grained,moderately strong & hard Quartzite Gneiss.	22.50	-19.50																			
23.00							v v																						
23.50							v v																						
24.00	CS	24.0-25.50			74.6	37.5	v v																						
24.50							v v																						
25.00							v v		to	to																			
25.50	CS	25.50-26.50			94.0	59.0	v v																						
26.00							v v																						
26.50	CS	26.50-27.50			72.0	50.0	v v																						
27.00							v v																						
27.50							v v		27.50	-24.50																			
28.00																													
28.50																													
29.00																													
29.50																													
30.00																													

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
20.50-21.50	2.56	2.00	2.60	150.00	5.00
22.50-24.0	2.77	0.60	2.78	231.00	12.00
25.5-26.50	2.78	1.00	2.75	245.00	12.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Near Knnur Railway Station
Chainage 448+660
Bore Hole No: GT 105A
R.L. of BH (m) 9.400
Termination Depth of Borehole : 20.50m

Date of starting:23.12.19
Date of completion:27.12.19
Period of Lab.Tets :13.02.20 to 25.02.20

Static Ground Water Table:+8.40m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 11°53'03"N ,75°21'46"E

Notation

DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00								Top surface soil followed by medium to dense,reddish brown Moorum.	0.00	9.40																			
0.50																													
1.00																													
1.50	DS	1.50-1.95	1.50	21							GM	45	25	← 30 →						Non Plastic							-		
2.00																													
2.50																													
3.00	DS	3.0-3.45	3.00	27							GM	40	24	← 36 →			1.95		2.69	Non Plastic					0.10	32.0			
3.50									to	to							(Suggested)								(Suggested)				
4.00																													
4.50	DS	4.50-4.95	4.50	35							GM	34	24	← 42 →						Non Plastic									
5.00																													
5.50																													
6.00	DS	6.0-6.45	6.00	47							GM	43	33	← 24 →						Non Plastic									
6.50																													
7.00									7.50	1.90																			
7.50	DS	7.50-7.95	7.50	20,100 blows for 2cm				Completely weathered rock,converted to brownish yellow very dense residual soil.	7.50	1.90	SM	0	74	← 26 →			2.00			Non Plastic					0.00	35.0			
8.00																	(Suggested)								(Suggested)				
8.50																													
9.00																													
9.50																													
10.00																													
10.50	DS	10.50-10.95	10.50	15,100 blows for 5cm							SM	30	37	← 33 →						Non Plastic									
11.00									to	to																			
11.50																													
12.00																													
12.50																													
13.00																													
13.50	DS	13.50-13.95	13.50	>100							SM	0	76	← 24 →						Non Plastic									
14.00																													
14.50									15.00	-5.60																			

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Near Knnur Railway Station
Chainage 448+660 Date of starting:23.12.19 Static Ground Water Table:+8.40m
Bore Hole No: GT 105A Date of completion:27.12.19 Method of boring : Rotary Mud Circulation, Rotary Drilling
R.L. of BH (m) 9.400 Period of Lab.Tets :13.02.20 to 25.02.20 Type of bit used:TC/Diamond
Termination Depth of Borehole : 20.50m Co -ordinate 11°53'03"N ,75°21'46"E

Notation

DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
15.00	CS	15.0-16.0	15.00	Refusal	88.0	53.0	▦	Fresh ,brownish grey,fine grained,moderately hard Sand Stone.	15.00	-5.60	Sedimentary Rock																		
15.50																													
16.00	CS	16.0-17.0			81.0	50.0																							
16.50																													
17.00	CS	17.0-18.0			88.0	60.0																							
17.50									to	to																			
18.00	CS	18.0-19.0			90.0	63.0																							
18.50																													
19.00	CS	19.0-20.50			76.0	51.0																							
19.50																													
20.00																													
20.50									20.50	-11.10																			
21.00																													
21.50																													
22.00																													
22.50																													
23.00																													
23.50																													
24.00																													
24.50																													
25.00																													
25.50																													
26.00																													
26.50																													
27.00																													
27.50																													
28.00																													
28.50																													
29.00																													
29.50																													
30.00																													

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight (gm/cc)	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength,
15.0-16.0	2.40	1.50	2.42	115.00	4.00
17.0-18.0	2.48	1.80	2.45	145.00	6.00
19.0-20.50	2.48	1.50	2.49	131.00	6.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Near Knnur Railway Station
Chainage 454+067
Bore Hole No: GT 106
R.L. of BH (m) 6.000
Termination Depth of Borehole : 35.00m

Date of starting:23.12.19
Date of completion:28.12.19
Period of Lab.Tets :13.02.20 to 25.02.20

Static Ground Water Table:+4.08m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 11°55'46.5"N ,75°20'47.9"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00									0.00	6.00																			
0.50	DS	0.50						Top surface filled up ground with sand.	to	to																			
1.00																													
1.50	DS	1.50-1.95	1.50	6					1.60	4.40	SM	0	86	← 14 →							Non Plastic								
2.00									1.60	4.40																			
2.50																													
3.00	UDS	(UDS slipped due to non cohesive sandy soil)																											
3.50	DS	3.50-3.95	3.50	13							SM	2	81	← 17 →			1.54				Non Plastic				0.00	30.0			
4.00																	(Suggested)									(Suggested)			
4.50	DS	4.50-4.95	4.50	18																									
5.00																													
5.50								Medium dense,brownish grey silty fine to medium sand with traces of mica and kankar.																					
6.00	DS	6.0-6.45	6.00	21					to	to	SM	1	85	← 14 →			1.60		2.62		Non Plastic				0.00	32.0			
6.50																	(Suggested)									(Suggested)			
7.00																													
7.50	DS	7.50-7.95	7.50	28																									
8.00																													
8.50																													
9.00																													
9.50																													
10.00									10.50	-4.50																			
10.50	DS	10.50-10.95	10.50	33					10.50	-4.50	SP	2	95	← 3 →			1.80		2.65		Non Plastic				0.00	34.0			
11.00																	(Suggested)									(Suggested)			
11.50																													
12.00																													
12.50								Dense,yellowish brown silty medium to coarse sand with little kankar.																					
13.00									to	to																			
13.50	DS	13.50-13.95	13.50	38							SM	3	78	← 19 →							Non Plastic								
14.00																													
14.50																													
15.00									22.50	-16.50																			

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Near Knnur Railway Station
Chainage 454+067
Bore Hole No: GT 106
R.L. of BH (m) 6.000
Termination Depth of Borehole : 35.00m

Date of starting:23.12.19
Date of completion:28.12.19
Period of Lab.Tets :13.02.20 to 25.02.20

Static Ground Water Table:+4.08m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 11°55'46.5"N ,75°20'47.9"E

Notation

DS :Disturbed Sample
UDS :Undisturbed sample
SL :Slipped
TS :Triaxial test(UU)
W.A. :Water absorption
CS:Rock core sample
RQD:Rock Quality Designation
CR:Core Recovery
DT : Direct Shear test
Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
15.50								-do-																					
16.00																													
16.50	DS	16.50-16.95	16.50	43							SM	2	81	17						Non Plastic									
17.00																													
17.50																													
18.00																													
18.50																													
19.00																													
19.50	DS	19.50-19.95	19.50	48							SM	4	75	21			1.90		2.63	Non Plastic					0.00	35.0			
20.00																	(Suggested)								(Suggested)				
20.50																													
21.00																													
21.50																													
22.00																													
22.50	CS	22.50-24.0	22.50	Refusal	45.0	0.0	v v v	Highly weathered,thinly bedded,fine grained,disintegrated Mica Schist.	22.50	-16.50	Metamorphic Rock																		
24.00	CS	24.0-25.50			47.0	0.0	v v v																						
25.50	CS	25.50-27.0			57.0	0.0	v v v		to	to																			
27.00	CS	27.0-28.50			65.0	0.0	v v v																						
28.50	CS	28.50-30.0			57.0	0.0	v v v																						
29.00							v v v		30.00	-24.00																			
30.00	CS	30.0-31.0			84.0	56.0	v v v	Fresh ,dark grey,fine grained,moderately strong & hard Quartzite Gneiss.	30.00	-24.00																			
30.50							v v v																						
31.00	CS	31.0-32.50			83.0	51.0	v v v																						
32.00							v v v																						
32.50	CS	32.50-34.0			77.0	59.0	v v v		to	to																			
33.00							v v v																						
34.00	CS	34.0-35.0			75.0	56.0	v v v																						
34.50							v v v																						
35.00							v v v																						
35.50							v v v		35.00	-29.00																			

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
24.0-25.50	2.56	2.00	2.52		3.00
30.0-31.0	2.71	0.50	2.75	262.00	13.00
32.50-34.0	2.71	0.60	2.78	231.00	9.00
34.0-35.0	2.78	0.60	2.75	251.00	12.00

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Irinave LC
Chainage 459+900
Bore Hole No: GT 107A
R.L. of BH (m) 3.000
Termination Depth of Borehole : 25.00m

Date of starting:28.12.19
Date of completion:3.1.20
Period of Lab.Tets :13.02.20 to 25.02.20

Static Ground Water Table:+2.0m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 11°58'44"N ,75°19'45"E

Notation

DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e$_0$
0.00								Top surface soil followed by loose to medium dense,brownish grey micaceous fine to medium sand.	0.00	3.00																			
0.50																													
1.00																													
1.50	DS	1.50-1.95	1.50	6							SM	0	85	← 15 →			1.65		2.63	Non Plastic					0.00	28.0	-		
2.00																	(Suggested)								(Suggested)				
2.50																													
3.00	DS	3.0-3.45	3.00	10																									
3.50																													
4.00																													
4.50	DS	4.50-4.95	4.50	11							SP	0	97	← 3 →			1.72		2.65	Non Plastic					0.00	30.0			
5.00									to	to							(Suggested)								(Suggested)				
5.50																													
6.00	DS	6.0-6.45	6.00	16																									
6.50																													
7.00																													
7.50	DS	7.50-7.95	7.50	15							SM	0	85	← 15 →						Non Plastic									
8.00																													
8.50																													
9.00																													
9.50																													
10.00									10.50	-7.50																			
10.50	DS	10.50-10.95	10.50	20,100 blows for 5cm			v v v	Highly to moderately weathered,brownish grey,thinly bedded,fine grained,disintegrated Mica Schist.	10.50	-7.50	Metamorphic Rock																		
11.00	CS	11.0-12.0	11.00	Refusal	48.0	0.0	v v v																						
11.50							v v v																						
12.00	CS	12.0-13.0			21.0	0.0	v v v																						
12.50							v v v																						
13.00	CS	13.0-14.0			16.0	0.0	v v v		to	to																			
13.50							v v v																						
14.00	CS	14.0-15.0			23.0	0.0	v v v																						
14.50							v v v																						
15.00	CS	15.0-16.0			28.0	0.0	v v v		25.00	-22.00																			

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
12.0-13.0	2.44	1.60	2.45		2.00
16.0-17.50	2.60	0.60	2.62	105.00	4.38
19.0-20.0	2.51	1.30	2.50	90.00	3.75
21.0-22.0	2.40	1.10	2.45	-	3.00
23.0-24.0	2.58	0.60	2.60	-	4.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Irinave LC
Chainage 459+900
Bore Hole No: GT 107A
R.L. of BH (m) 3.000
Termination Depth of Borehole : 25.00m

Date of starting:28.12.19
Date of completion:3.1.20
Period of Lab.Tets :13.02.20 to 25.02.20

Static Ground Water Table:+2.0m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 11°58'44"N ,75°19'45"E

Notation

DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
15.50							v v v	Highly to moderately weathered,brownish grey,thinly bedded,fine grained,disintegrated Mica Schist.			Metamorphic Rock																		
16.00	CS	16.0-17.50			77.0	46.0	v v v																						
16.50							v v v																						
17.00							v v v																						
17.50	CS	17.50-19.0			32.0	11.0	v v v																						
18.00							v v v																						
18.50							v v v																						
19.00	CS	19.0-20.0			25.0	6.0	v v v																						
19.50							v v v																						
20.00	CS	20.0-21.0	20.00	100 blows for 1cm	12.0	0.0	v v v																						
20.50							v v v																						
21.00	CS	21.0-22.0			12.0	0.0	v v v																						
21.50							v v v																						
22.00	CS	22.0-23.0	22.00	100 blows for 5cm	17.0	0.0	v v v																						
22.50							v v v																						
23.00	CS	23.0-24.0			17.0	0.0	v v v																						
23.50							v v v																						
24.00	CS	24.0-25.0	24.00	100 blows for 3cm	11.0	0.0	v v v																						
24.50							v v v																						
25.00																													
25.50																													
26.00																													
26.50																													
27.00																													
27.50																													
28.00																													
28.50																													
29.00																													
29.50																													
30.00																													

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Village Rd,Cherukunnu
Chainage 465+935
Bore Hole No: GT 108A
R.L. of BH (m) 23.000
Termination Depth of Borehole : 37.00m

Date of starting:24.12.19
Date of completion:30.12.19
Period of Lab.Tets :13.02.20 to 25.02.20

Static Ground Water Table:+21.80m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12°00'30.2"N ,75°16'53.7"E

Notation			
DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e$_0$
0.00								Top surface soil followed by stiff,light brown silty clay with sand and gravels	0.00	23.00																			
0.50									to	to																			
1.00																													
1.50	DS	1.50-1.95	1.50	16					1.60	21.40	CL	23	27	50						32	22	10					-		
2.00								Loose to medium dense,reddish yellow silty micaceous fine to medium sand.	1.70	21.30																			
2.50																													
3.00	DS	3.0-3.45	3.00	4							SM	0	87	←13→			1.60		2.63	Non Plastic					0.00	25.0			
3.50																	(Suggested)								(Suggested)				
4.00																													
4.50	DS	4.50-4.95	4.50	23					to	to	SM	10	75	←15→			1.85		2.65	Non Plastic					0.00	31.0			
5.00																	(Suggested)								(Suggested)				
5.50																													
6.00																													
6.50																													
7.00																													
7.50	DS	7.50-7.95	7.50	12					8.00	15.00																			
8.00								Stiff,dark grey ,silty clay with traces of fine sand.	8.00	15.00																			
8.50																													
9.00																													
9.50																													
10.00																													
10.50	DS	10.50-10.95	10.50	13							CI	0	3	72	25					40	19	21							
11.00																													
11.50									to																				
12.00																													
12.50																													
13.00																													
13.50	UDS	13.50-13.95									CI	0	3	72	25	29.0	1.92	1.49	2.69	40	20	20	16	TS	0.78	2.0	1.70	0.18	0.81
14.00																													
14.50																													
15.00									16.50	6.50																			

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Village Rd,Cherukunnu
Chainage 465+935
Bore Hole No: GT 108A
R.L. of BH (m) 23.000
Termination Depth of Borehole : 37.00m

Date of starting:24.12.19
Date of completion:30.12.19
Period of Lab.Tets :13.02.20 to 25.02.20

Static Ground Water Table:+21.80m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12°00'30.2"N ,75°16'53.7"E

Notation

DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
15.50								-do-																					
16.00																													
16.50	DS	16.50-16.95	16.50	80				Very dense,brownish grey silty fine to medium sand.Lenses of mica observed scatterdly.	16.50	6.50	SM	0	85	← 15 →						Non Plastic									
17.00																													
17.50																													
18.00																													
18.50																													
19.00																													
19.50	DS	19.50-19.95	19.50	56							SM	0	81	← 19 →			2.00			Non Plastic					0.00	35.0			
20.00																	(Suggested)								(Suggested)				
20.50																													
21.00																													
21.50																													
22.00									to	to																			
22.50	DS	22.50-22.95	22.50	63							SM	0	82	← 18 →						Non Plastic									
23.00																													
23.50																													
24.00																													
24.50																													
25.00																													
25.50	DS	25.50-25.95	25.50	67							SM	3	81	← 16 →						Non Plastic									
26.00																													
26.50																													
27.00																													
27.50																													
28.00									28.50	-5.50																			
28.50	DS	28.50-28.95	28.50	18				Very stiff,blackish grey silty clay.	28.50	-5.50	CI	0	2	73	25		1.95			40	20	20	14		1.10	0.00			
29.00									to	to							(Suggested)								(Suggested)				
29.50																													
30.00									33.00	-10.00																			

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Village Rd,Cherukunnu
Chainage 465+935
Bore Hole No: GT 108A
R.L. of BH (m) 23.000
Termination Depth of Borehole : 37.00m

Date of starting:24.12.19
Date of completion:30.12.19
Period of Lab.Tets :13.02.20 to 25.02.20

Static Ground Water Table:+21.80m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12°00'30.2"N ,75°16'53.7"E

Notation
DS :Disturbed Sample
UDS :Undisturbed sample
SL :Slipped
TS :Triaxial test(UU)
W.A. :Water absorption
CS:Rock core sample
RQD:Rock Quality Designation
CR:Core Recovery
DT : Direct Shear test
Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed "N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
30.50							▨																						
31.00																													
31.50	DS	31.50-31.95	31.50	20				-do-			CI	0	3	69	28					39	20	19	16						
32.00																													
32.50																													
33.00		33.00	33.00	>100					33.00	-10.00																			
33.50																													
34.00																													
34.50																													
35.00								Sample not retrieved.	to	to																			
35.50																													
36.00																													
36.50																													
37.00		37.00	37.00	>100					37.00	-14.00																			
37.50																													
38.00																													
38.50																													
39.00																													
39.50																													
40.00																													
40.50																													
41.00																													
41.50																													
42.00																													
42.50																													
43.00																													
43.50																													
44.00																													
44.50																													
45.00																													

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Approach of Kuppam River
Chainage 467+738
Bore Hole No: GT 109
R.L. of BH (m) 6.100
Termination Depth of Borehole : 26.00m

Date of starting:3.1.20
Date of completion:7.1.20
Period of Lab.Test :23.02.20 to 13.3.20

Static Ground Water Table:+5.30m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12°01'22.8"N ,75°16'24.9"E

Notation

DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00							▩	Top surface soil followed by very loose,brownish grey,fine to medium micaceous silty sand.	0.00	6.10																			
0.50																													
1.00																													
1.50	DS	1.50-1.95	1.50	5							SM	5	66	← 29 →						Non Plastic							-		
2.00									to	to																			
2.50																													
3.00	UDS	3.0-3.45									SM	2	69	← 29 →		8.0	1.80	1.67	2.62	Non Plastic				DT	0.00	28.0			
3.50																													
4.00									4.50	1.60																			
4.50	DS	4.50-4.95	4.50	5			▒	Medium to stiff,blackish grey silty clay with some sand and calcareous nodules.	4.50	1.60																			
5.00																													
5.50																													
6.00	UDS	6.0-6.45									CI	3	7	60	30	29.6	1.88	1.45	2.67	43	20	23	16	TS	0.30	3.0	0.52	0.19	0.84
6.50																													
7.00																													
7.50	DS	7.50-7.95	7.50	6																									
8.00																													
8.50																													
9.00	UDS	9.0-9.45							to	to	CI	1	4	69	26	27.5	1.90	1.49	2.68	42	20	22	17	TS	0.35	2.0	0.65	0.20	0.80
9.50																													
10.00																													
10.50	DS	10.50-10.95	10.50	12																									
11.00																													
11.50																													
12.00	UDS	12.0-12.45									CI	0	8	66	26	29.0	1.90	1.47	2.68	41	19	22	-	TS	0.70	3.0	1.20	0.19	0.82
12.50																													
13.00									13.50	-7.40																			
13.50	DS	13.50-13.95	13.50	32			▩	Completely weathered rock converted to dense to very dense brownish yellow	13.50	-7.40	SM	3	12	← 85 →		7.00	1.95			Non Plastic					0.00	32.0			
14.00									to	to							(Suggested)									(Suggested)			
14.50																													
15.00									21.00	-14.90																			

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Approach of Kuppam River
Chainage 467+738
Bore Hole No: GT 109
R.L. of BH (m) 6.100
Termination Depth of Borehole : 26.00m

Date of starting:3.1.20
Date of completion:7.1.20
Period of Lab.Test :23.02.20 to 13.3.20

Static Ground Water Table:+5.30m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12°01'22.8"N ,75°16'24.9"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
15.50																													
16.00																													
16.50	DS	16.50-16.95	16.50	100																									
17.00																													
17.50								residual soil consisting sand and gravels with some fines.																					
18.00	DS	18.0-18.45	18.00	100							SM	25	40	←35→		8.00	2.00			Non Plastic					0.00	35.0			
18.50																	(Suggested)									(Suggested)			
19.00																													
19.50	DS	19.50-19.95	19.50	100																									
20.00																													
20.50																													
21.00	CS	21.0-23.0	21.00	>100	40.0	0.0		Highly weathered,disintegrated ,brownish grey ,weak Sand Stone.	21.00	-14.90	Sedimentary Rock																		
21.50																													
22.00																													
22.50																													
23.00	CS	23.0-24	23.00	>100	43.0	0.0																							
23.50									to	to																			
24.00	CS	24.0-25.0			49.0	0.0																							
24.50																													
25.00	CS	25.0-26.0	25.00	>100																									
25.50																													
26.00									26.00	-19.90																			
26.50																													
27.00																													
27.50																													
28.00																													
28.50																													
29.00																													
29.50																													
30.00																													

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
23.0-24.0	2.47	2.00	2.45	-	2.00
24.0-25.0	2.36	1.50	2.38	-	2.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Village Road,Kunhimangalam,kandamkulangara
Chainage 475+100
Bore Hole No: GT 110
R.L. of BH (m) 6.500
Termination Depth of Borehole : 27.00m

Date of starting:10.1.20
Date of completion:17.1.20
Period of Lab.Test :23.02.20 to 13.3.20

Static Ground Water Table:+6.0m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12°04'15.0"N ,75°13'38.7"E

Notation

DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT Depth (m)	SPT Observed"N" Value	Rock Sample CR (%)	Rock Sample RQD (%)	Log Symbol	Description of Strata	Strata Depth (m) From / To	Strata Depth (m) RL	IS classification	Grain Size Distribution % Gravel	% Sand	% Silt	% clay	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits LL (%)	PL (%)	PI(%)	Ws (%)	Shearing Strength characteristic Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Consolidation Characteristic Cc	e_0
0.00									0.00	6.50																			
0.50																													
1.00																													
1.50	DS	1.50-1.95	1.50	5							SM	0	81	← 19 →						Non Plastic							-		
2.00																													
2.50								Top surface soil followed by very loose to loose,brownish grey silty fine to medium sand.																					
3.00	UDS	3.0-3.45									SM	5	71	← 24 →		8.0	1.69	1.56	2.65	Non Plastic				DT	0.00	28.0		-	-
3.50	DS	3.50-3.95	3.50	6					to	to																			
4.00																													
4.50	DS	4.50-4.95	4.50	6																									
5.00																													
5.50																													
6.00	UDS	(UDS slipped due to non cohesive sandy soil)																											
6.50	DS	6.50-6.95	6.50	7							SM	2	65	← 33 →						Non Plastic									
7.00									7.50	-1.00																			
7.50	DS	7.50-7.95	7.50	16					7.50	-1.00	SM	8	71	← 21 →		8.0	1.80		2.63	Non Plastic					0.00	31.0			
8.00																	(Suggested)									(Suggested)			
8.50																													
9.00																													
9.50																													
10.00								Medium dense,brownish to yellowish grey silty fine to medium sand..Little gravels observed intermittently.																					
10.50	DS	10.50-10.95	10.50	19							SP	2	95	← 3 →						Non Plastic									
11.00									to	to																			
11.50																													
12.00																													
12.50																													
13.00																													
13.50	DS	13.50-13.95	13.50	22							SM	4	71	← 25 →		8.0	1.85			Non Plastic					0.00	32.0			
14.00																	(Suggested)									(Suggested)			
14.50																													
15.00									16.50	-10.00																			

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Village Road,Kunhimangalam,kandamkulangara
Chainage 475+100
Bore Hole No: GT 110
R.L. of BH (m) 6.500
Termination Depth of Borehole : 27.00m

Date of starting:10.1.20
Date of completion:17.1.20
Period of Lab.Test :23.02.20 to 13.3.20

Static Ground Water Table:+6.0m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12°04'15.0"N ,75°13'38.7"E

Notation

DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
15.50								-do-																					
16.00																													
16.50	DS	16.50-16.95	16.50	31				Completely weathered rock converted to dense to very dense brownish yellow residual soil consisting sand and kankar with some fines.	16.50	-10.00																			
17.00																													
17.50																													
18.00																													
18.50																													
19.00																													
19.50	DS	19.50-19.95	19.50	48							SM	10	52	← 38 →		5.0	2.00			Non Plastic					0.00	35.0			
20.00																	(Suggested)									(Suggested)			
20.50																													
21.00																													
21.50																													
22.00									to	to																			
22.50	DS	22.50-22.54	22.50	100 blows for 4cm																									
23.00																													
23.50																													
24.00																													
24.50																													
25.00																													
25.50	DS	25.50-25.55	25.50	100 blows for 5cm																									
26.00																													
26.50																													
27.00	DS	27.0-27.03	27.00	100 blows for 3cm																									
27.50									27.00	-20.50																			
28.00																													
28.50																													
29.00																													
29.50																													
30.00																													

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Approach of River ,Near Railway Overbridge Payyanur
Chainage 481+290
Bore Hole No: GT 111A
R.L. of BH (m) 5.100
Termination Depth of Borehole : 40.50m

Date of starting:29.12.19
Date of completion:02.1.20
Period of Lab.Tets :13.02.20 to 25.02.20

Static Ground Water Table:+3.35m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12° 6'30.56"N ,75°11'26.33"E

Notation			
DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00									0.00	5.10																			
0.50	DS	0.50																											
1.00																													
1.50	DS	1.50-1.95	1.50	5							SM	0	82	← 18 →						Non Plastic							-		
2.00								Top surface soil followed by loose,brownish yellow silty fine sand.	to	to																			
2.50																													
3.00	UDS	3.0-3.45									SM	0	85	← 15 →		11.0	1.66	1.50	2.63	Non Plastic				DT	0.00	29.0		-	-
3.50																													
4.00									4.50	0.60																			
4.50	DS	4.50-4.95	4.50	14					4.50	0.60	SM	10	72	← 18 →			1.72		2.62	Non Plastic					0.00	31.0			
5.00																	(Suggested)								(Suggested)				
5.50																													
6.00	DS	6.0-6.45	6.00	18																									
6.50																													
7.00								Medium dense,brownish grey silty micaceous fine to medium sand.	to	to																			
7.50	DS	7.50-7.95	7.50	22							SM	6	77	← 17 →						Non Plastic									
8.00																													
8.50																													
9.00																													
9.50									10.00	-4.90																			
10.00	CS	10.0-11.60	10.00	100 blows 2cm	8.0	0.0			10.00	-4.90																			
10.50																													
11.00								Highly weathered,disintegrated, dark grey sand stone	to	to	Sedimentary Rock																		
11.50	CS	11.60-12.50	11.60	100 blows 3cm	14.0	0.0																							
12.00																													
12.50									13.00	-7.90																			
13.00									13.00	-7.90																			
13.50	DS	13.50-13.95	13.50	27							SM	5	68	← 27 →			1.80		2.62	Non Plastic					0.00	32.0			
14.00								Medium to dense,brownish grey,silty micaceosus fine to medium sand.	to	to							(Suggested)								(Suggested)				
14.50																													
15.00									28.00	-22.90																			

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Approach of River ,Near Railway Overbridge Payyanur
Chainage 481+290
Bore Hole No: GT 111A
R.L. of BH (m) 5.100
Termination Depth of Borehole : 40.50m

Date of starting:29.12.19
Date of completion:02.1.20
Period of Lab.Tets :13.02.20 to 25.02.20

Static Ground Water Table:+3.35m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12° 6'30.56"N ,75°11'26.33"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
15.50								Medium to dense,brownish grey,silty micaceosus fine to medium sand.																					
16.00																													
16.50	DS	16.50-16.95	16.50	36							SM	3	81	← 16 →						Non Plastic									
17.00																													
17.50																													
18.00																													
18.50																													
19.00																													
19.50	DS	19.50-19.95	19.50	40							SP	0	98	← 2 →			1.90			Non Plastic					0.00	34.0			
20.00																	(Suggested)								(Suggested)				
20.50																													
21.00																													
21.50																													
22.00											SP	0	97	← 3 →						Non Plastic									
22.50	DS	22.50-22.95	22.50	40																									
23.00																													
23.50																													
24.00																													
24.50																													
25.00																													
25.50	DS	25.50-25.95	25.50	45							SM	0	87	← 13 →						Non Plastic									
26.00																													
26.50																													
27.00																													
27.50																													
28.00								Very dense,brownish grey,silty fine to medium sand.Lenses of mica observed scatterdly.	28.00	-22.90																			
28.50	DS	28.50-28.95	28.50	51							SM	0	85	← 15 →						Non Plastic									
29.00									to	to																			
29.50																													
30.00									40.50	-35.40																			

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Approach of River ,Near Railway Overbridge Payyanur
Chainage 481+290
Bore Hole No: GT 111A
R.L. of BH (m) 5.100
Termination Depth of Borehole : 40.50m

Date of starting:29.12.19
Date of completion:02.1.20
Period of Lab.Tets :13.02.20 to 25.02.20

Static Ground Water Table:+3.35m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12° 6'30.56"N ,75°11'26.33"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
30.50																													
31.00																													
31.50	DS	31.50-31.95	31.50	55							SM	0	86	← 14 →			2.00			Non Plastic					0.00	36.0			
32.00																	(Suggested)								(Suggested)				
32.50																													
33.00																													
33.50																													
34.00																													
34.50	DS	34.50-34.95	34.50	108							SM	0	85	← 15 →						Non Plastic									
35.00																													
35.50								-do-																					
36.00																													
36.50																													
37.00																													
37.50	DS	37.50-37.95	37.50	>100							SP	0	97	← 3 →						Non Plastic									
38.00																													
38.50																													
39.00																													
39.50																													
40.00																													
40.50	DS	40.50-40.95	100 blows for 10cm																										
41.00																													
41.50																													
42.00																													
42.50																													
43.00																													
43.50																													
44.00																													
44.50																													
45.00																													

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Near Thrikaripur Railway Station
Chainage 458+495
Bore Hole No: GT 112
R.L. of BH (m) 2.600
Termination Depth of Borehole : 44.00m

Date of starting:5.1.20
Date of completion:11.1.20
Period of Lab.Tets :13.02.20 to 25.02.20

Static Ground Water Table:(-)0.10m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12° 8'36.32"N ,75°10'33.20"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e$_0$
0.00									0.00	2.60																			
0.50																													
1.00																													
1.50	DS	1.50-1.95	1.50	12							SM	0	86	← 14 →		11.00	1.77		2.62	Non Plastic					0.00	30.0	-		
2.00																	(Suggested)								(Suggested)				
2.50																													
3.00	DS	3.0-3.45	3.00	15																									
3.50																													
4.00																													
4.50	DS	4.50-4.95	4.50	16							SM	0	83	← 17 →		11.00	1.80		2.65	Non Plastic					0.00	30.0			
5.00																	(Suggested)								(Suggested)				
5.50																													
6.00	DS	6.0-6.45	6.00	12				Top surface soil followed by medium dense,reddish yellow silty medium to fine sand.																					
6.50																													
7.00									to	to																			
7.50	DS	7.50-7.95	7.50	15							SP	4	93	← 3 →						Non Plastic									
8.00																													
8.50																													
9.00																													
9.50																													
10.00																													
10.50	DS	10.50-10.95	10.50	10							SM	0	78	← 22 →						Non Plastic									
11.00																													
11.50																													
12.00	DS	12.0-12.45	12.00	8																									
12.50																													
13.00																													
13.50	UDS	13.50-13.95							14.15	-11.55	SM	0	73	← 27 →		13.0	1.81	1.60	2.65	Non Plastic			-	DT	0.00	30.0	-	-	-
14.00	CS	14.15-15.0	14.15	Refusal	14.0	0.0		Part of boulder. Reddish in colour.	14.15	-11.55																			
14.50									to	to	BB																		
15.00	CS	15.0-16.0			25.0	0.0			17.00	-14.40																			

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Near Thrikaripur Railway Station

Chainage	458+495	Date of starting:5.1.20	Static Ground Water Table:(-)0.10m
Bore Hole No:	GT 112	Date of completion:11.1.20	Method of boring : Rotary Mud Circulation, Rotary Drilling
R.L. of BH (m)	2.600	Period of Lab.Tets :13.02.20 to 25.02.20	Type of bit used:TC/Diamond
Termination Depth of Borehole : 44.00m			Co -ordinate 12° 8'36.32"N ,75°10'33.20"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
15.50																													
16.00	CS	16.0-17.0			22.0	0.0		-do-																					
16.50																													
17.00									17.00	-14.40																			
17.50																													
18.00																													
18.50																													
19.00																													
19.50								Very dense,brownish grey gravelly sand with some fines.			SM	40	45	← 15 →		7.0	2.00		2.63	Non Plastic					0.00	36.0			
20.00	DS	20.0-20.45	20.00	39,100 blows for 5 cm					to	to							(Suggested)								(Suggested)				
20.50																													
21.00																													
21.50																													
22.00																													
22.50									23.00	-20.40																			
23.00	DS	23.0-23.45	23.00	17					23.00	-20.40	CI	0	7	65	28					42	19	23	16						
23.50																													
24.00																													
24.50	DS	24.50-24.95	24.50	27																									
25.00								Very stiff,brownish grey silty clay with little sand and calcareous nodules.																					
25.50									to	to																			
26.00	UDS	26.0-26.45									CI	0	7	63	30	13.0	1.95	1.73	2.70	41	20	21	19	TS	1.30	4.00	2.00	0.14	0.56
26.50																													
27.00																													
27.50									28.00	-25.40																			
28.00									28.00	-25.40																			
28.50								Medium dense /dense,yellowish brown silty medium to coarse sand.																					
29.00	DS	29.0-29.45	29.00	37					to	to	SM	0	79	← 21 →		9.0	1.90		2.62	Non Plastic					0.00	33.0			
29.50																	(Suggested)								(Suggested)				
30.00									44.00	-41.40																			

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Near Thrikaripur Railway Station
Chainage 458+495
Bore Hole No: GT 112
R.L. of BH (m) 2.600
Termination Depth of Borehole : 44.00m
Date of starting:5.1.20
Date of completion:11.1.20
Period of Lab.Tets :13.02.20 to 25.02.20
Static Ground Water Table:(-)0.10m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12° 8'36.32"N ,75°10'33.20"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
30.50																													
31.00																													
31.50																													
32.00	DS	32.0-32.45	32.00	28							SM	0	86	← 14 →		11.0	1.85			Non Plastic					0.00	32.0			
32.50																	(Suggested)								(Suggested)				
33.00																													
33.50																													
34.00																													
34.50																													
35.00	DS	35.0-35.45	35.00	23																									
35.50																													
36.00																													
36.50																													
37.00								Medium dense /dense,yellowish brown silty medium to coarse sand.																					
37.50																													
38.00	DS	38.0-38.45	38.00	35							SP	0	97	← 3 →		8.0	1.90			Non Plastic					0.00	33.0			
38.50																	(Suggested)								(Suggested)				
39.00																													
39.50																													
40.00																													
40.50																													
41.00	DS	41.0-41.45	41.00	24																									
41.50																													
42.00																													
42.50																													
43.00																													
43.50																													
44.00	DS	44.0-44.45	44.00	54							SM	0	91	← 9 →						Non Plastic									
44.50																													
45.00																													

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Chirayaru
Chainage 490+075
Bore Hole No: GT 113
R.L. of BH (m) 3.500
Termination Depth of Borehole : 36.00m

Date of starting:13.1.20
Date of completion:16.1.20
Period of Lab.Test :23.02.20 to 13.3.20

Static Ground Water Table:+3.20m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12° 11'24.0"N, 75°09'38.8"E

Notation

DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e$_0$
0.00								Top surface soil followed by loose,brownish grey silty fine sand.	0.00	3.50																			
0.50																													
1.00																													
1.50	DS	1.50-1.95	1.50	8							SM	0	81	← 19 →		9.0	1.75		2.65	Non Plastic					0.00	29.0	-		
2.00																	(Suggested)									(Suggested)			
2.50																													
3.00	DS	3.0-3.45	3.00	10					to	to																			
3.50																													
4.00																													
4.50	DS	4.50-4.95	4.50	14							SP	0	96	← 4 →						Non Plastic									
5.00																													
5.50									6.00	-2.50																			
6.00	DS	6.0-6.45	6.00	14				Stiff,dark grey silty clay with sand and kankar.	6.00	-2.50																			
6.50																													
7.00									to	to																			
7.50	UDS	7.50-7.95									CI	2	10	60	28	26.0	1.95	1.55	2.68	42	20	22	17	TS	0.70	4.0	1.10	0.16	0.73
8.00																													
8.50									9.00	-5.50																			
9.00								Medium dense,reddish brown silty fine to medium sand with some gravels.	9.00	-5.50																			
9.50																													
10.00																													
10.50	DS	10.50-10.95	10.50	27							SM	0	81	← 19 →		8.0	1.80		2.63	Non Plastic					0.00	32.0			
11.00																	(Suggested)									(Suggested)			
11.50																													
12.00									to	to																			
12.50																													
13.00																													
13.50	DS	13.50-13.95	13.50	38							SM	2	80	← 18 →		8.0	1.95		2.65	Non Plastic					0.00	34.0			
14.00																	(Suggested)									(Suggested)			
14.50																													
15.00									19.00	-15.50																			

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Chirayaru
Chainage 490+075
Bore Hole No: GT 113
R.L. of BH (m) 3.500
Termination Depth of Borehole : 36.00m

Date of starting:13.1.20
Date of completion:16.1.20
Period of Lab.Test :23.02.20 to 13.3.20

Static Ground Water Table:+3.20m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12° 11'24.0"N, 75°09'38.8"E

Notation

DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
15.50							▨																						
16.00																													
16.50	DS	16.50-16.95	16.50	30																									
17.00								-do-																					
17.50																													
18.00																													
18.50																													
19.00							▨		19.00	-15.50																			
19.50	DS	19.50-19.95	19.50	19																									
20.00								Very stiff,dark grey silty clay with little fine sand.	to	to																			
20.50																													
21.00	UDS	21.0-21.45									CI	0	8	67	25	24.0	1.96	1.58	2.68	42	20	22	18	TS	1.00	3.0	1.80	0.14	0.70
21.50									22.00	-18.50																			
22.00							▨		22.00	-18.50																			
22.50																													
23.00																													
23.50																													
24.00	DS	24.0-24.45	24.00	57							SM	10	71	←19→						Non Plastic									
24.50																													
25.00																													
25.50								Very dense,brownish grey silty fine to medium sand with some gravels.																					
26.00									to	to																			
26.50																													
27.00	DS	27.0-27.45	27.00	48							SM	11	68	←21→		5.0	1.95			Non Plastic					0.00	35.0			
27.50																	(Suggested)									(Suggested)			
28.00																													
28.50																													
29.00																													
29.50																													
30.00	DS	30.0-30.02	30.00	100 blows for 2cm					36.00	-32.50																			

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Chirayaru
Chainage 490+075
Bore Hole No: GT 113
R.L. of BH (m) 3.500
Termination Depth of Borehole : 36.00m

Date of starting:13.1.20
Date of completion:16.1.20
Period of Lab.Test :23.02.20 to 13.3.20

Static Ground Water Table:+3.20m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12° 11'24.0"N, 75°09'38.8"E

Notation
DS :Disturbed Sample
CS:Rock core sample
UDS :Undisturbed sample
RQD:Rock Quality Designation
SL :Slipped
CR:Core Recovery
TS :Triaxial test(UU)
DT : Direct Shear test
W.A. :Water absorption
Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
30.50							▨																						
31.00																													
31.50																													
32.00																													
32.50																													
33.00	DS	33.0-33.05	33.00	100 blows for 5cm																									
33.50								-do-																					
34.00																													
34.50																													
35.00																													
35.50																													
36.00	DS	36.0-36.18	36.00	25,100blows for 3cm																									
36.50																													
37.00																													
37.50																													
38.00																													
38.50																													
39.00																													
39.50																													
40.00																													
40.50																													
41.00																													
41.50																													
42.00																													
42.50																													
43.00																													
43.50																													
44.00																													
44.50																													
45.00																													

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Approach of Tejaswini River
Chainage 496+357
Bore Hole No: GT 114
R.L. of BH (m) 15.500
Termination Depth of Borehole : 43.00m

Date of starting:18.1.20
Date of completion:22.1.20
Period of Lab.Test :23.02.20 to 13.3.20

Static Ground Water Table:+15.0m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12°14'9.54"N 75° 8'53.27"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00							▨	Top surface soil followed by loose to medium dense,reddish brown silty medium to fine sand.Traces of gravels observed closely.	0.00	15.50																			
0.50																													
1.00																													
1.50	DS	1.50-1.95	1.50	10							SM	1	72	← 27 →		11.0	1.80		2.63	Non Plastic					0.00	30.0	-		
2.00																	(Suggested)									(Suggested)			
2.50																													
3.00	DS	3.0-3.45	3.00	12																									
3.50																													
4.00																													
4.50	DS	4.50-4.95	4.50	12																									
5.00																													
5.50																													
6.00	DS	6.0-6.45	6.00	15							SM	2	78	← 20 →		8.0	1.85		2.63	Non Plastic					0.00	31.0			
6.50																	(Suggested)									(Suggested)			
7.00																													
7.50	DS	7.50-7.95	7.50	16					to	to																			
8.00																													
8.50																													
9.00																													
9.50																													
10.00																													
10.50	DS	10.50-10.95	10.50	23							SM	3	71	← 26 →						Non Plastic									
11.00																													
11.50																													
12.00																													
12.50																													
13.00																													
13.50	UDS	13.50-13.95									SM	10	65	← 25 →		11.0	1.94	1.75	2.65	Non Plastic				DT	0.00	32.0			
14.00																													
14.50																													
15.00									15.50	0.00																			

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Approach of Tejaswini River
Chainage 496+357
Bore Hole No: GT 114
R.L. of BH (m) 15.500
Termination Depth of Borehole : 43.00m

Date of starting:18.1.20
Date of completion:22.1.20
Period of Lab.Test :23.02.20 to 13.3.20

Static Ground Water Table:+15.0m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12°14'9.54"N 75° 8'53.27"E

Notation
DS :Disturbed Sample
UDS :Undisturbed sample
SL :Slipped
TS :Triaxial test(UU)
W.A. :Water absorption
CS:Rock core sample
RQD:Rock Quality Designation
CR:Core Recovery
DT : Direct Shear test
Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
15.50							▨	Stiff to very stiff,dark grey silty clay with some sand and calcareous nodules.	15.50	0.00																			
16.00																													
16.50	DS	16.50-16.95	16.50	9							CI	0	2	75	23					40	20	20							
17.00																													
17.50																													
18.00																													
18.50																													
19.00																													
19.50	UDS	19.50-19.95									CI	0	11	64	25	25.0	1.91	1.53	2.68	41	20	21	16	TS	0.70	2.0	0.90	0.17	0.75
20.00																													
20.50																													
21.00																													
21.50																													
22.00																													
22.50	DS	22.50-22.95	22.50	17					to	to																			
23.00																													
23.50																													
24.00																													
24.50																													
25.00																													
25.50	DS	25.50-25.95	25.50	16							CI	2	8	65	25					42	21	21							
26.00																													
26.50																													
27.00																													
27.50																													
28.00																													
28.50	DS	28.50-28.95	28.50	24																									
29.00																													
29.50																													
30.00									30.50	-15.00																			

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Approach of Tejaswini River
Chainage 496+357
Bore Hole No: GT 114
R.L. of BH (m) 15.500
Termination Depth of Borehole : 43.00m

Date of starting:18.1.20
Date of completion:22.1.20
Period of Lab.Test :23.02.20 to 13.3.20

Static Ground Water Table:+15.0m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12°14'9.54"N 75° 8'53.27"E

Notation

DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
30.50							▨	Completely weathered rock converted to dense to very dense brownish yellow residual soil consisting sand and kankar with some fines.	30.50	-15.00																			
31.00																													
31.50	DS	31.50-31.95	31.50	82							SM	0	80	← 20 →		5.0	2.00		2.63	Non Plastic					0.00	35.0			
32.00																	(Suggested)								(Suggested)				
32.50																													
33.00									to	to																			
33.50																													
34.00																													
34.50	DS	34.50-34.85	34.50	8,24,100 blows for 5cm																									
35.00																													
35.50									36.00	-20.50																			
36.00	CS	36.0-37.0	36.00	50,Refusal	30.0	0.0	v v	Highly weathered,disintegrated ,brownish grey ,weak Mica Schist.	36.00	-20.50	Metamorphic Rock																		
36.50							v v																						
37.00	CS	37.0-38.0	37.00	15,Refusal	25.0	0.0	v v																						
37.50							v v																						
38.00	CS	38.0-39.0			22.0	0.0	v v																						
38.50							v v																						
39.00	CS	39.0-40.0	39.00	25,Refusal	17.0	0.0	v v																						
39.50							v v		to	to																			
40.00	CS	40.0-41.5			26.0	0.0	v v																						
40.50							v v																						
41.00							v v																						
41.50	CS	41.50-43.0	41.50	10,refusal	40.0	0.0	v v																						
42.00							v v																						
42.50							v v																						
43.00							v v		43.00	-27.50																			
43.50																													
44.00																													
44.50																													
45.00																													

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
36.0-37.0	2.59	0.90	2.68		0.40
38.0-39.0	2.59	1.20	2.65		0.20
41.50-43.0	2.62	1.50	2.65		0.40

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Padanakkad Flyover-NH 47
Chainage 501+978
Bore Hole No: GT 115
R.L. of BH (m) 3.400
Termination Depth of Borehole : 26.00m

Date of starting:19.1.20
Date of completion:23.1.20
Period of Lab.Test :23.02.20 to 13.3.20

Static Ground Water Table:+2.40m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12°16'11.21"N 75° 6'47.25"E

Notation			
DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00							▨		0.00	3.40																			
0.50																													
1.00																													
1.50	DS	1.50-1.95	1.50	15							SM	3	71	←26→		6.0	1.80		2.63	Non Plastic					0.00	31.0	-		
2.00																	(Suggested)									(Suggested)			
2.50																													
3.00	DS	3.0-3.45	3.00	17				Top surface soil followed by medium dense,reddish brown silty sand with little gravels.																					
3.50									to	to																			
4.00																													
4.50	DS	4.50-4.95	4.50	18							SP	5	91	← 4 →						Non Plastic									
5.00																													
5.50																													
6.00	DS	6.0-6.45	6.00	19																									
6.50																													
7.00									7.50	-4.10																			
7.50	UDS	7.50-7.95					▦	Stiff,dark grey silty clay with sand and gravels.	7.50	-4.10	CL	5	26	48	21	23.0	2.00	1.63	2.66	32	19	13	22	TS	0.80	6.0	1.30	0.13	0.64
8.00																													
8.50																													
9.00									to	to																			
9.50																													
10.00									10.50	-7.10																			
10.50	DS	10.50-10.58	10.50	100 blows for 8cm			▨	Very dense,brownish grey silty medium to fine sand with little gravels.	10.50	-7.10	SM	10	52	←38→		6.0	2.00		2.63	Non Plastic					0.00	35			
11.00																	(Suggested)									(Suggested)			
11.50																													
12.00																													
12.50									to	to																			
13.00																													
13.50	DS	13.50-13.56	13.50	100 blows for 6 cm																									
14.00																													
14.50																													
15.00									16.00	-12.60																			

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Padanakkad Flyover-NH 47
Chainage 501+978
Bore Hole No: GT 115
R.L. of BH (m) 3.400
Termination Depth of Borehole : 26.00m

Date of starting:19.1.20
Date of completion:23.1.20
Period of Lab.Test :23.02.20 to 13.3.20

Static Ground Water Table:+2.40m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12°16'11.21"N 75° 6'47.25"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
15.50							▩▩	-do-																					
16.00	CS	16.0-17.0	16.00	Refusal	30.0	0.0	v v	Highly weathered,disintegrated ,brownish grey ,weak Mica Schist.	16.00	-12.60	Metamorphic Rock																		
16.50							v v																						
17.00	CS	17.0-19.50			49.0	0.0	v v																						
17.50							v v																						
18.00							v v		to	to																			
18.50							v v																						
19.00							v v																						
19.50	CS	19.50-21.0			41.0	0.0	v v																						
20.00							v v																						
20.50							v v		21.00	-17.60																			
21.00	CS	21.0-22.0			59.0	56.0	v v	Slightly weathered to fresh ,dark grey,fine grained,moderately strong & hard Quartzite Gneiss.	21.00	-17.60																			
21.50							v v																						
22.00	CS	22.0-23.0			93.0	47.0	v v																						
22.50							v v																						
23.00	CS	23.0-24.0			76.0	70.0	v v																						
23.50							v v		to	to																			
24.00	CS	24.0-25.0			91.0	39.0	v v																						
24.50							v v																						
25.00	CS	25.0-26.0			72.0	41.0	v v																						
25.50							v v																						
26.00							v v		26.00	-22.60																			
26.50																													
27.00																													
27.50																													
28.00																													
28.50																													
29.00																													
29.50																													
30.00																													

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
21.0-22.0	2.78	1.00	2.77	198.00	7.00
23.0-24	2.85	0.50	2.83	256.00	13.00
24.0-25.0	2.79	0.80	2.80	241.00	13.00
25.0-26.0	2.82	0.80	2.82	259.00	11.00

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location:	Badrakaali Rd,Kanhangad LC
Chainage	507+385
Bore Hole No:	GT 116
R.L. of BH (m)	7.400

Termination Depth of Borehole : 20.00m

Date of starting:25.1.20

Date of completion:28.1.20

Period of Lab.Test :23.02.20 to 13.3.20

Static Ground Water Table:+6.40m

Method of boring : Rotary Mud Circulation, Rotary Drilling

Type of bit used:TC/Diamond

Co -ordinate 12°18'43.6"N 75°05'18.6"E

Notation

DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00								Top surface soil followed by loose to medium dense,reddish yellow silty fine to medium sand with little angular garvels.	0.00	7.40																			
0.50																													
1.00																													
1.50	DS	1.50-1.95	1.50	9							SM	4	78	← 18 →		11.0	1.75		2.62	Non Plastic					0.00	28.0	-		
2.00																	(Suggested)									(Suggested)			
2.50																													
3.00	UDS	(UDS slipped due to non cohesive sandy soil)																											
3.50	DS	3.50-3.95	3.50	10																									
4.00																													
4.50	DS	4.50-4.95	4.50	11					to	to	SP	1	96	← 3 →						Non Plastic									
5.00																													
5.50																													
6.00	UDS	(UDS slipped due to non cohesive sandy soil)																											
6.50	DS	6.50-6.95	6.50	12																									
7.00																													
7.50	DS	7.50-7.95	7.50	15							SM	5	70	← 25 →		10.0	1.79		2.63	Non Plastic					0.00	31.0			
8.00																	(Suggested)									(Suggested)			
8.50																													
9.00																													
9.50									10.00	-2.60																			
10.00								Very dense,yellowish brown silty medium to coarse sand with little gravels.	10.00	-2.60																			
10.50	DS	10.50-10.70	10.50	30, 100blows for 5cm							SM	0	81	← 19 →		6.0	1.90		2.63	Non Plastic					0.00	35			
11.00																	(Suggested)									(Suggested)			
11.50																													
12.00									to	to																			
12.50																													
13.00																													
13.50	DS	13.50-13.52	13.50	100blows for 2cm																									
14.00																													
14.50									15.00	-7.60																			

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Badrakaali Rd,Kanhangad LC
Chainage 507+385
Bore Hole No: GT 116
R.L. of BH (m) 7.400
Termination Depth of Borehole : 20.00m

Date of starting:25.1.20
Date of completion:28.1.20
Period of Lab.Test :23.02.20 to 13.3.20

Static Ground Water Table:+6.40m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12°18'43.6"N 75°05'18.6"E

Notation			
DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT Depth (m)	SPT Observed"N" Value	Rock Sample CR (%)	Rock Sample RQD (%)	Log Symbol	Description of Strata	Strata Depth (m) From / To	RL	IS classification
15.00	CS	15.0-16.50	15.00	Refusal	92.0	61.0	v v	Moderately fresh ,dark grey,fine grained,non foliated,moderately strong and hard Gneiss.	15.00	-7.60	Metamorphic Rock
15.50							v v				
16.00							v v				
16.50	CS	16.50-18.0			87.0	54.0	v v				
17.00							v v				
17.50							v v		to	to	
18.00	CS	18.0-19.0			91.0	58.0	v v				
18.50							v v				
19.00	CS	19.0-20.0			68.0	52.0	v v				
19.50							v v				
20.00							v v		20.00	-12.60	
20.50											
21.00											
21.50											
22.00											
22.50											
23.00											
23.50											
24.00											
24.50											
25.00											
25.50											
26.00											
26.50											
27.00											
27.50											
28.00											
28.50											
29.00											
29.50											
30.00											

Grain Size Distribution % Gravel	% Sand	% Silt	% clay	Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits LL (%)	PL (%)	PI(%)	Ws (%)	Shearing Strength characteristic Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Consolidation Characteristic Cc	e_0

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
15.0-16.50	2.88	0.40	2.85	291.00	14.00
18.0-19.0	2.80	0.80	2.81	321.00	15.00
19.0-20.0	2.89	0.80	2.90	301.00	14.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Village Rd,South Chittari,Kanhangad
Chainage 511+000
Bore Hole No: GT 117
R.L. of BH (m) 6.000
Termination Depth of Borehole : 15.00m

Date of starting:25.1.20
Date of completion:27.1.20
Period of Lab.Test :23.02.20 to 13.3.20

Static Ground Water Table:+5.0m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12°20'32.02"N 75° 4'32.67"E

Notation		
DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00								Top surface soil followed by medium to dense,yellowish brown silty fine to medium sand with little rounded gravels.	0.00	6.00																			
0.50																													
1.00																													
1.50	DS	1.50-1.95	1.50	15							SM	4	78	← 18 →		9.0	1.84		2.62	Non Plastic					0.00	31.0	-		
2.00																	(Suggested)									(Suggested)			
2.50																													
3.00	DS	3.0-3.45	3.00	33					to	to	SM	8	69	← 23 →		8.0	1.95		2.62	Non Plastic					0.00	34.0			
3.50																	(Suggested)									(Suggested)			
4.00																													
4.50	DS	4.50-4.95	4.50	38																									
5.00																													
5.50																													
6.00	DS	6.0-6.45	6.00	42							SP	1	96	← 3 →						Non Plastic									
6.50									7.00	-1.00																			
7.00	CS	7.0-8.0	7.00	Refusal	20.0	0.0	v v v	Highly weathered,disintegrated ,brownish grey ,weak Mica Schist.	7.00	-1.00	Metamorphic Rock																		
7.50							v v v																						
8.00	CS	8.0-9.0			70.0	0.0	v v v																						
8.50							v v v		to	to																			
9.00	CS	9.0-10.0			78.0	20.0	v v v																						
9.50							v v v		10.00	-4.00																			
10.00	CS	10.0-11.0			86.0	61.0	v v v	Moderately fresh ,dark grey,fine grained,non foliated,moderately strong and hard quartzite Gneiss.	10.00	-4.00																			
10.50							v v v																						
11.00	CS	11.0-12.0			86.0	45.0	v v v																						
11.50							v v v																						
12.00	CS	12.0-13.0			76.0	29.0	v v v																						
12.50							v v v		to	to																			
13.00	CS	13.0-14.0			80.0	62.0	v v v																						
13.50							v v v																						
14.00	CS	14.0-15.0			90.0	62.0	v v v																						
14.50							v v v																						
15.00							v v v		15.00	-9.00																			

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
9.0-10.0	2.66	2.00	2.65	110.00	4.58
10.0-11.0	2.78	0.90	2.79	130.00	9.00
12.0-13.0	2.77	0.90	2.80	225.00	8.00
14.0-15.0	2.78	0.50	2.80	234.00	11.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Approach of Chithari River
Chainage 514+255
Bore Hole No: GT 118
R.L. of BH (m) 3.700
Termination Depth of Borehole : 18.00m

Date of starting:24.1.20
Date of completion:26.1.20
Period of Lab.Test :23.02.20 to 13.3.20

Static Ground Water Table:+2.70m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12°21'59.24"N 75° 3'32.23"E

Notation	
DS :Disturbed Sample	CS:Rock core sample
UDS :Undisturbed sample	RQD:Rock Quality Designation
SL :Slipped	CR:Core Recovery
TS :Triaxial test(UU)	DT : Direct Shear test
W.A. :Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00								Top surface soil followed by loose,reddish yellow silty fine to medium sand with little gravels.	0.00	3.70																			
0.50																													
1.00									to	to																			
1.50	DS	1.50-1.95	1.50	8							SM	2	68	← 30 →		11.0	1.77		2.62		Non Plastic				0.00	28.0	-		
2.00																	(Suggested)									(Suggested)			
2.50									3.00	0.70																			
3.00	UDS	3.0-3.45						Stiff,reddish brown silty clay with some calcareous nodules.	3.00	0.70	CL	2	18	65	15	26.0	1.88	1.49	2.67	32	21	11	22	TS	0.50	5.0	0.90	0.18	0.79
3.50																													
4.00									to	to																			
4.50	DS	4.50-4.95	4.50	12																									
5.00																													
5.50									6.00	-2.30																			
6.00	DS	6.0-6.45	6.00	12				Completely weathered rock converted to dense brownish yellow residual soil consisting sand and kankar with some fines.	6.00	-2.30	SM	3	81	← 16 →		9.0	1.88		2.69		Non Plastic				0.00	30.0			
6.50														(Suggested)											(Suggested)				
7.00																													
7.50	Sludg -	7.50-8.50			0.0	0.0			to	to																			
8.00																													
8.50	Sludg	8.50-10.0			0.0	0.0																							
9.00																													
9.50									10.00	-6.30																			
10.00	CS	10.0-11.0			19.0	0.0	v v v	Highly weathered,disintegrated ,brownish grey ,weak,foliated Mica Schist.	10.00	-6.30	Metamorphic Rock																		
10.50							v v v																						
11.00	CS	11.0-12.0			64.0	30.0	v v v																						
11.50							v v v																						
12.00	CS	12.0-13.0			39.0	22.0	v v v																						
12.50							v v v																						
13.00	CS	13.0-14.0	13.00	100 blows for 1cm	47.0	16.0	v v v		to	to																			
13.50							v v v																						
14.00	CS	14.0-15.0			59.0	30.0	v v v																						
15.00	CS	15.0-16.0			48.0	0.0	v v v																						
16.00							v v v																						
18.00	CS	16.0-18.0			39.0	15.0	v v v		18.00	-14.30																			

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
11.0-12.0	2.69	1.10	2.70	131.00	6.00
12.0-13.0	2.65	1.30	2.68	121.00	8.00
13.0-14.0	2.69	1.10	2.68	145.00	8.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Edappally - Panvel Highway,Pallikere(ROB)
Chainage 517+850
Bore Hole No: GT 119A
R.L. of BH (m) 18.500
Termination Depth of Borehole : 24.00m

Date of starting:30.1.20
Date of completion:2.2.20
Period of Lab.Test :23.02.20 to 13.3.20

Static Ground Water Table:+17.50m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12°23'34.58"N 75° 2'25.54"E

Notation			
DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00							░	Top surface soil followed by reddish brown sand.	0.00 to 1.50	18.50 to 17.00																			
0.50																													
1.00																													
1.50	DS	1.50-1.95	1.50	13			▨	Very stiff,reddish brown lateritic deposit.Clay pockets observed at some places.	1.50	17.00																	-		
2.00																													
2.50																													
3.00	UDS	3.0-3.45									CL	9	25	51	15	24.0	1.96	1.58	2.68	32	19	13	23	TS	0.80	9.0	1.40	0.16	0.70
3.50	DS	3.50-3.95	3.50	35																									
4.00																													
4.50	DS	4.50-4.95	4.50	>100							CL	15	25	41	19					34	19	15							
5.00																													
5.50																													
6.00	UDS	6.0-6.45									SC	19	46	22	13	23.0	1.95	1.59	2.67	33	18	15	21	TS	0.30	15.0	0.46	0.13	0.68
6.50	DS	6.50-6.95	6.50	15																									
7.00									to	to																			
7.50	DS	7.50-7.95	7.50	17																									
8.00																													
8.50																													
9.00																													
9.50																													
10.00																													
10.50	DS	10.50-10.95	10.50	12							CL	25	22	37	16					33	18	15							
11.00																													
11.50																													
12.00																													
12.50																													
13.00									13.50	5.00																			
13.50	DS	13.50-13.65	13.50	50,Refusal			░	Completely weathered rock converted to dense brownish yellow residual soil	13.50	5.00	SM	15	66	← 19 →		8.0	1.95			Non Plastic					0.00	33.0			
14.00									to	to							(Suggested)									(Suggested)			
14.50																													
15.00									17.50	1.00																			

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Edappally - Panvel Highway,Pallikere(ROB)
Chainage 517+850
Bore Hole No: GT 119A
R.L. of BH (m) 18.500
Termination Depth of Borehole : 24.00m

Date of starting:30.1.20
Date of completion:2.2.20
Period of Lab.Test :23.02.20 to 13.3.20

Static Ground Water Table:+17.50m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12°23'34.58"N 75° 2'25.54"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
15.50							▨																						
16.00							▨	consisting sand and kankar with some fines.																					
16.50	DS	16.50-16.65	16.50	50,Refusal			▨																						
17.00							▨																						
17.50	CS	17.50-18.50	17.50	100 blows for 5cm	12.0	0.0	v v	Highly weathered,disintegrated ,brownish grey ,weak,foliated Mica Schist.	17.50	1.00	Metamorphic Rock																		
18.00							v v																						
18.50	CS	18.50-20.0			36.0	0.0	v v																						
19.00							v v																						
19.50							v v																						
20.00	CS	20.0-21.50	20.00	100 blows for 8cm	50.0	26.0	v v		to	to																			
20.50							v v																						
21.00							v v																						
21.50	CS	21.50-22.50			8.0	0.0	v v																						
22.00							v v																						
22.50	DS	22.50-24.0	22.50	100 blows for 2 cm	0.0	0.0	v v																						
23.00							v v		24.00	-5.50																			
23.50																													
24.00																													
24.50																													
25.00																													
25.50																													
26.00																													
26.50																													
27.00																													
27.50																													
28.00																													
28.50																													
29.00																													
29.50																													
30.00																													

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
20.0-21.5	2.66	1.10	2.70	172.00	8.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Approach of River,Malankunnu ,Pallikkara II
Chainage 519+950
Bore Hole No: GT 120A
R.L. of BH (m) 10.300
Termination Depth of Borehole : 15.50m

Date of starting:27.1.20
Date of completion:29.1.20
Period of Lab.Test :23.02.20 to 13.3.20

Static Ground Water Table:+9.80m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12°24'31.8"N 75°01'47.7"E

Notation			
DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00							▨		0.00	10.30																			
0.50							▨																						
1.00							▨																						
1.50	DS	1.50-1.95	1.50	10			▨	Top surface soil followed by loose,reddish yellow silty fine to medium sand.			SM	7	74	← 19 →						Non Plastic							-		
2.00							▨		to	to																			
2.50							▨																						
3.00	UDS	3.0-3.45					▨				SM	5	69	← 26 →		11.0	1.78	1.60	2.62	Non Plastic				DT	0.00	29.0			
3.50	DS	3.50-3.95	3.50	3			▨																						
4.00							▨		4.50	5.80																			
4.50	DS	4.50-4.95	4.50	6			▦	Medium stiff,reddish yellow silty clay with	4.50	5.80	CL	0	15	64	21					31	19	12	20						
5.00							▦		to 5.50	to 4.8																			
5.50							▨		5.50	4.80																			
6.00	UDS	6.0-6.45					▨	Loose,reddish grey silty sand.Clay pockets observed closely.			SM	2	81	← 17 →		13.0	1.72	1.52	2.63	Non Plastic				DT	0.00	28.0			
6.50	DS	6.50-6.45	6.50	6			▨																						
7.00							▨		to	to																			
7.50	DS	7.50-7.95	7.50	8			▨																						
8.00							▨		8.50	1.80																			
8.50							▦		8.50	1.80																			
9.00	DS	9.0-9.45	9.00	12			▦	Stiff,yellowish grey silty clay with little fine to medium sand.			CI	2	12	58	28		1.88			41	20	21	15		0.75	0.0			
9.50							▦		to	to							(Suggested)									(Suggested)			
10.00							▦		10.50	-0.20																			
10.50	CS	10.50-11.50	10.50	Refusal	71.0	61.0	v v		10.50	-0.20																			
11.00							v v				Metamorphic Rock																		
11.50	CS	11.50-12.50			61.0	60.0	v v																						
12.00							v v	Moderately fresh ,dark grey,fine grained,non foliated,moderately strong and hard quartzite Gneiss.																					
12.50	CS	12.50-13.50			66.0	62.0	v v																						
13.00							v v		to	to																			
13.50	CS	13.50-14.50			96.0	82.0	v v																						
14.00							v v																						
14.50	CS	14.50-15.50			100	92.0	v v																						
15.00							v v		15.50	-5.20																			

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
11.50-12.50	2.71	0.30	2.80	245.00	9.00
12.50-13.50	2.80	0.80	2.82	291.00	13.00
14.50-15.50	2.72	0.90	2.78	249.00	11.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Edappally - Panvel Highway,Udma
Chainage 523+045
Bore Hole No: GT 121
R.L. of BH (m) 6.600
Termination Depth of Borehole : 23.00m

Date of starting:30.1.20
Date of completion:2.2.20
Period of Lab.Test :23.02.20 to 13.3.20

Static Ground Water Table:+4.30m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12°26'08.1"N 75°01'26.0"E

Notation

DS	:Disturbed Sample	CS:Rock core sample
UDS	:Undisturbed sample	RQD:Rock Quality Designation
SL	:Slipped	CR:Core Recovery
TS	:Triaxial test(UU)	DT : Direct Shear test
W.A.	:Water absorption	Ws :Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00							▨	Completely weathered mudstone converted to too hard residual soil.	0.00	6.60																			
0.50																													
1.00																													
1.50	DS	1.50-1.70	1.50	34,100 blows for 5cm							CI	4	13	62	21					36	18	18					-		
2.00																													
2.50																													
3.00	DS	3.0-3.19	3.00	20,100 blows for 4cm							CI	2	16	60	22					38	19	19							
3.50																													
4.00																													
4.50	DS	4.50-4.70	4.50	75,25 blows for 15cm																									
5.00																													
5.50																													
6.00	DS	6.0-6.18	6.00	40,100 blows for 3cm							CI	0	12	72	16					36	17	19							
6.50																													
7.00																													
7.50	DS	7.50-17.67	7.50	45,100 blows for 2cm					to	to																			
8.00																													
8.50																													
9.00																													
9.50																													
10.00																													
10.50	UDS	10.50-10.95									CI	1	6	69	24	18.0	2.02	1.71	2.72	38	18	20	15	TS	1.70	5.0	2.60	0.10	0.59
11.00																													
11.50																													
12.00																													
12.50																													
13.00																													
13.50	DS	13.50-13.95	13.50	45							CI	0	6	72	22					40	21	19							
14.00																													
14.50									15.00	-8.40																			

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Edappally - Panvel Highway,Udma
Chainage 523+045
Bore Hole No: GT 121
R.L. of BH (m) 6.600
Termination Depth of Borehole : 23.00m

Date of starting:30.1.20
Date of completion:2.2.20
Period of Lab.Test :23.02.20 to 13.3.20

Static Ground Water Table:+4.30m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12°26'08.1"N 75°01'26.0"E

Notation			
DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
15.00	CS	15.0-16.0	15.00	Refusal	19.0	0.0	v v	Highly weathered,disintegrated ,dark grey ,weak,foliated Mica Schist.	15.00	-8.40	Metamorphic Rock																		
15.50							v v																						
16.00	CS	16.0-17.0			17.0	0.0	v v																						
16.50							v v																						
17.00	CS	17.0-18.0	17.00	100 blows for 5cm	19.0	0.0	v v																						
17.50							v v																						
18.00	CS	18.0-19.0			34.0	0.0	v v																						
18.50							v v																						
19.00	CS	19.0-20.0			34.0	0.0	v v		to	to																			
19.50							v v																						
20.00	CS	20.0-21.0	20.00	100 blows for 3cm	35.0	0.0	v v																						
20.50							v v																						
21.00	CS	21.0-22.0			34.0	0.0	v v																						
21.50							v v																						
22.00	CS	22.0-23.0	22.00	100 blows for 3cm	56.0	0.0	v v																						
22.50							v v																						
23.00							v v		23.00	-16.40																			
23.50																													
24.00																													
24.50																													
25.00																													
25.50																													
26.00																													
26.50																													
27.00																													
27.50																													
28.00																													
28.50																													
29.00																													
29.50																													
30.00																													

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
16.0-17.0	2.46	2.00	2.55		3.50
19.0-20.0	2.56	1.50	2.60		3.20
22.0-23.0	2.61	1.50	2.59		3.80

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Approach of Chandragiri Puzha
Chainage 528+715
Bore Hole No: GT 122
R.L. of BH (m) 2.800
Termination Depth of Borehole : 30.00m

Date of starting:31.1.20
Date of completion:10.2.20
Period of Lab.Test :23.02.20 to 13.3.20

Static Ground Water Table:+1.80m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12°28'34.8"N 75°59'44.1"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e$_0$
0.00							▨	Top surface soil followed by loose,grey silty medium to coarse sand with little kankar.	0.00	2.80																			
0.50																													
1.00																													
1.50	DS	1.50-1.95	1.50	7							SM	5	71	← 24 →		10.0	1.78		2.62	Non Plastic					0.00	28.0	-		
2.00																(Suggested)										(Suggested)			
2.50									to	to																			
3.00	DS	3.0-3.45	3.00	9																									
3.50																													
4.00																													
4.50	DS	4.50-4.95	4.50	14							SM	11	69	← 20 →						Non Plastic									
5.00																													
5.50									6.00	-3.20																			
6.00	DS	6.0-6.45	6.00	9			▨	Stiff ,whitish grey cementitious silty clay with some calcareous nodules.	6.00	-3.20																			
6.50																													
7.00																													
7.50	UDS	7.50-7.95									CI	6	16	53	25	25.0	1.90	1.52	2.68	42	20	22	19	TS	0.60	3.0	1.10	0.18	0.76
8.00																													
8.50																													
9.00																													
9.50																													
10.00																													
10.50	DS	10.50-10.95	10.50	15					to	to	CI	9	13	57	21					40	21	19							
11.00																													
11.50																													
12.00																													
12.50																													
13.00																													
13.50	DS	13.50-13.95	13.50	18																									
14.00																													
14.50																													
15.00	UDS	15.0-15.45							19.50	-16.70	CI	9	10	59	22	24.0	2.00	1.61	2.69	40	21	19	16	TS	1.10	3.0	2.00	0.12	0.67

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Approach of Chandragiri Puzha
Chainage 528+715
Bore Hole No: GT 122
R.L. of BH (m) 2.800
Termination Depth of Borehole : 30.00m

Date of starting:31.1.20
Date of completion:10.2.20
Period of Lab.Test :23.02.20 to 13.3.20

Static Ground Water Table:+1.80m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12°28'34.8"N 75°59'44.1"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
15.50								-do-																					
16.00																													
16.50																													
17.00																													
17.50																													
18.00	DS	18.0-18.45	18.00	14																									
18.50																													
19.00																													
19.50	DS	19.50-19.95	19.50	17				Medium dense,brownish medium to coarse silty sand.	19.50 to 21.00	-16.70 to -18.20	SM	5	72	← 23 →			1.90 (Suggested)			Non Plastic					0.00	32.0 (Suggested)			
20.00																													
20.50																													
21.00	CS	21.0-22.0	21.00	Refusal	20.0	0.0	v v	Highly weathered,disintegrated ,dark grey ,weak,foliated Mica Schist.	21.00 to 30.00	-18.20 to -27.20	Metamorphic Rock																		
21.50							v v																						
22.00	CS	22.0-23.0			23.0	0.0	v v																						
22.50							v v																						
23.00	CS	23.0-24.0			27.0	0.0	v v																						
23.50							v v																						
24.00	CS	24.0-25.0	24.00	100 blows for 2cm	22.0	0.0	v v																						
24.50							v v																						
25.00	CS	25.0-26.0			40.0	0.0	v v																						
25.50							v v																						
26.00	CS	26.0-27.0			48.0	14.0	v v																						
26.50							v v																						
27.00	CS	27.0-28.0	27.00	100 blows for 3cm	50.0	0.0	v v																						
27.50							v v																						
28.00	CS	28.0-29.0			29.0	0.0	v v																						
28.50							v v																						
29.00	CS	29.0-30.0	29.00	100 blows for 2cm	25.0	0.0	v v																						
29.50							v v																						
30.00							v v																						

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight (gm/cc)	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength,
21.0-22.0	2.62	1.60	2.63		2.00
25.0-26.0	2.68	1.50	2.65		2.00
26.0-27.0	2.65	1.00	2.66	89.00	4.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Location: Near Bangarakunnu
Chainage 533+569
Bore Hole No: GT 123A
R.L. of BH (m) 2.800
Termination Depth of Borehole : 21.00m

Date of starting:6.2.20
Date of completion:10.2.20
Period of Lab.Test :23.02.20 to 13.3.20

Static Ground Water Table:+0.80m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12°30'44.6"N 75°58'18.8"E

Notation

DS	:Disturbed Sample	CS:Rock core sample	
UDS	:Undisturbed sample	RQD:Rock Quality Designation	
SL	:Slipped	CR:Core Recovery	
TS	:Triaxial test(UU)	DT : Direct Shear test	
W.A.	:Water absorption	Ws	:Shrinkage Limit

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
0.00								Top surface soil followed by loose to medium dense,grey micaceous silty fine to medium sand with little angular gravels.	0.00	2.80																			
0.50																													
1.00																													
1.50	DS	1.50-1.95	1.50	5							SM	8	71	← 21 →		10.0	1.65		2.62	Non Plastic					0.00	28.0	-		
2.00																	(Suggested)									(Suggested)			
2.50																													
3.00	DS	3.0-3.45	3.00	9																									
3.50																													
4.00																													
4.50	DS	4.50-4.95	4.50	14																									
5.00																													
5.50																													
6.00	DS	6.0-6.45	6.00	12							SP	0	96	← 4 →		9.0	1.78		2.63	Non Plastic					0.00	31.0			
6.50																	(Suggested)									(Suggested)			
7.00									to	to																			
7.50	DS	7.50-7.95	7.50	15																									
8.00																													
8.50																													
9.00																													
9.50																													
10.00																													
10.50	DS	10.50-10.95	10.50	13							SM	9	70	← 21 →						Non Plastic									
11.00																													
11.50																													
12.00																													
12.50																													
13.00																													
13.50	UDS	13.50-13.95									SM	6	66	← 28 →		9.0	1.82	1.67	2.63	Non Plastic			-	DT	0.00	31.0	-	-	-
14.00									14.50	-11.70																			
14.50								Reddish Laterite.	14.50	-11.70																			
15.00	DS	15.0-15.45	15.00	50					to 16.0	to -13.2																			

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

Project :Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

BOREHOLE LOG & TEST RESULTS

Notation
DS :Disturbed Sample
CS:Rock core sample
UDS :Undisturbed sample
RQD:Rock Quality Designation
SL :Slipped
CR:Core Recovery
TS :Triaxial test(UU)
DT : Direct Shear test
W.A. :Water absorption
Ws :Shrinkage Limit

Location: Near Bangarakunnu
Chainage 533+569
Bore Hole No: GT 123A
R.L. of BH (m) 2.800
Termination Depth of Borehole : 21.00m

Date of starting:6.2.20
Date of completion:10.2.20
Period of Lab.Test :23.02.20 to 13.3.20

Static Ground Water Table:+0.80m
Method of boring : Rotary Mud Circulation, Rotary Drilling
Type of bit used:TC/Diamond
Co -ordinate 12°30'44.6"N 75°58'18.8"E

Depth below EGL (m)	Type of sampling	Depth of sample /Run	SPT		Rock Sample		Log Symbol	Description of Strata	Strata Depth (m)		IS classification	Grain Size Distribution				Natural Moisture Content/WA (%)	Bulk Density(gm/cc)	Dry Density (gm/cc)	Specific Gravity	Atterberg Limits				Shearing Strength characteristic				Consolidation Characteristic	
			Depth (m)	Observed"N" Value	CR (%)	RQD (%)			From / To	RL		% Gravel	% Sand	% Silt	% clay					LL (%)	PL (%)	PI(%)	Ws (%)	Type of test	Cohesion (kg/cm^2)	Φ (degree)	UCC (kg/cm^2)	Cc	e_0
15.50							▨ ▨																						
16.00	CS	16.0-17.50	16.00	Refusal	58.0	50.0	v v	Moderately fresh ,dark grey,fine grained,moderately strong & hard Quartzite Gneiss.	16.00	-13.20	Metamorphic Rock																		
16.50							v v																						
17.00							v v																						
17.50	CS	17.50-18.50			47.0	20.0	v v																						
18.00							v v		to	to																			
18.50	CS	18.50-19.50			69.0	60.0	v v																						
19.00							v v																						
19.50	CS	19.50-21.0			98.0	80.0	v v																						
20.00							v v																						
20.50							v v		21.00	-18.20																			
21.00																													
21.50																													
22.00																													
22.50																													
23.00																													
23.50																													
24.00																													
24.50																													
25.00																													
25.50																													
26.00																													
26.50																													
27.00																													
27.50																													
28.00																													
28.50																													
29.00																													
29.50																													
30.00																													

TEST RESULTS OF ROCK SAMPLE

Depth (m)	Unit Weight	Water Absorption	Specific Gravity	Crushing Strength (kg/cm^2)	Point Load strength, kg/cm^2
16.0-17.50	2.82	0.60	2.85	291.00	14.00
17.50-18.50	2.70	1.50	2.72	155.00	8.00
19.50-21.0	2.78	0.80	2.75	205.00	8.00

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

CHEMICAL TEST RESULT

Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

	Chemical Test on Water sample					Chemical Test on Soil sample		
Location	BH No.	Depth (m)	pH value at 32^0c	Chloride content (mg/lit)	Sulphate content (mg/lit)	Sulphate content (%)	Chloride Content (%)	pH value at 32^0c
-	GT 59	2.00	7.50	66.00	202.00	-	-	-
	GT 100A	6.00	6.90	102.00	150.00	0.09	0.06	7.000
	GT 109	6.00	6.60	102.00	202.00	0.09	0.03	7.000
	GT 110	3.00	6.50	117.00	202.00	0.02	0.05	6.600
	GT 113	7.50	6.90	117.00	145.00	0.09	0.02	7.200
	GT 114	13.50	6.30	115.00	135.00	0.1	0.05	6.600
	GT 115	7.50	7.30	116.00	181.00	0.02	0.09	7.200
	GT 116	7.50	7.50	155.00	190.00	-	-	-
	GT 117	3.00	7.20	180.00	178.00	-	-	-
	GT 118	3.00	6.60	116.00	155.00	0.08	0.04	7.500
	GT 119A	3.00	6.90	121.00	178.00	0.02	0.09	7.200
	GT 120A	3.00	6.60	102.00	221.00	0.07	0.05	7.400
	GT 121	10.50	6.90	115.00	155.00	0.02	0.09	6.600
	GT 122	7.50	7.00	102.00	171.00	0.08	0.02	7.000
	GT 123A	13.50	6.10	117.00	180.00	0.02	0.05	6.600

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna

CHEMICAL TEST RESULT

Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

	Chemical Test on Water sample					Chemical Test on Soil sample		
Location	BH No.	Depth (m)	pH value at 32^0c	Chloride content (mg/lit)	Sulphate content (mg/lit)	Sulphate content (%)	Chloride Content (%)	pH value at 32^0c
-	GT 101A	3.50	7.00	55.00	198.00	0.020	0.020	7.100
	GT 102	3.00	6.40	111.00	200.00	0.03	0.05	6.800
	GT 103A	7.50	7.20	112.00	151.00	0.05	0.02	6.600
	GT 104	7.50	7.10	103.00	171.00	0.05	0.02	7.000
	GT 105A	6.00	6.20	102.00	191.00	0.02	0.08	6.900
	GT 106	4.50	7.20	118.00	151.00	0.02	0.09	7.100
	GT 107A	7.50	7.00	91.00	113.00	0.09	0.02	6.800
	GT 108A	13.50	6.20	132.00	178.00	0.09	0.01	7.200
	GT 111A	3.00	6.40	110.00	105.00	0.08	0.08	7.200
	GT 112	6.00	6.60	156.00	195.00	0.05	0.02	6.600

Depth of Water Table: 3.72 m BH: GT- 01

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.875	18.75	18.75		2		
3.00	3.45	3.23	1.875	18.75	18.75		7		
4.50	4.95	4.73	1.875	18.75	18.75	108.98	5	5.00	**5**
6.00	6.45	6.23	1.875	18.75	18.75	151.17	3	3.00	**3**
7.50	7.95	7.73	1.875	18.75	18.75	193.36	5	4.00	**4**
9.00	9.45	9.23	1.875	18.75	18.75	235.55	3	2.00	**2**
12.00	12.45	12.23	1.875	18.75	18.75	291.80	16	10.00	**10**
15.00	15.45	15.23	1.882	18.82	18.82	377.58	27	15.00	**15**
18.00	18.45	18.23	1.882	18.82	18.82	462.27	100	49.00	**32**
21.00	21.45	21.23	1.904	19.04	19.04	553.35	100	43.00	**29**
24.00	24.45	24.23	1.904	19.04	19.04	639.03	89	34.00	**25**

Depth of Water Table: 4.11 m

BH: GT- 02

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.880	18.80	18.80		10		
3.00	3.45	3.23	1.880	18.80	18.80		13		
4.50	4.95	4.73	1.880	18.80	18.80	109.28	15	15.00	**15**
6.00	6.45	6.23	1.880	18.80	18.80	151.58	14	12.00	**12**
7.50	7.95	7.73	1.880	18.80	18.80	193.88	16	12.00	**12**
10.50	10.95	10.73	1.880	18.80	18.80	250.28	21	15.00	**15**
13.50	13.95	13.73	1.880	18.80	18.80	334.88	26	16.00	**16**
16.50	16.95	16.73	1.908	19.08	19.08	425.72	100	52.00	**34**
19.50	19.95	19.73	1.908	19.08	19.08	511.58	100	46.00	**31**
21.50	21.95	21.73	1.908	19.08	19.08	587.90	100	41.00	**28**

Depth of Water Table: 4.45 m BH: GT- 04

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.885	18.85	18.85		6		
3.00	3.45	3.23	1.885	18.85	18.85		8		
4.50	4.95	4.73	1.885	18.85	18.85	109.57	15	15.00	**15**
6.00	6.45	6.23	1.885	18.85	18.85	151.98	19	16.00	**16**
7.50	7.95	7.73	1.890	18.90	18.90	194.91	27	21.00	**18**
10.50	10.95	10.73	1.890	18.90	18.90	251.61	49	34.00	**25**
13.50	13.95	13.73	1.905	19.05	19.05	339.33	75	44.00	**30**
15.00	15.45	15.23	1.905	19.05	19.05	410.77	100	53.00	**34**
18.00	18.45	18.23	1.905	19.05	19.05	467.92	100	49.00	**32**
20.00	20.45	20.23	1.905	19.05	19.05	544.12	100	44.00	**30**

Depth of Water Table: 3.40 m

BH: GT- 05

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.885	18.85	18.85		11		
3.00	3.45	3.23	1.885	18.85	18.85	67.15	9	10.00	**10**
4.50	4.95	4.73	1.891	18.91	18.91	109.91	42	41.00	**28**
6.00	6.45	6.23	1.891	18.91	18.91	152.46	8	7.00	**7**
7.50	7.95	7.73	1.891	18.91	18.91	195.01	25	19.00	**17**
9.00	9.45	9.23	1.891	18.91	18.91	237.56	64	46.00	**31**
12.00	12.45	12.23	1.891	18.91	18.91	294.29	100	64.00	**40**
15.00	15.45	15.23	1.891	18.91	18.91	379.38	100	56.00	**36**
17.00	17.45	17.23	1.891	18.91	18.91	455.02	45	22.00	**19**

Depth of Water Table: 2.17 m

BH: GT- 06

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.877	18.77	18.77		4		
3.00	3.45	3.23	1.877	18.77	18.77	66.87	5	6.00	**6**
4.50	4.95	4.73	1.877	18.77	18.77	109.10	7	7.00	**7**
6.00	6.45	6.23	1.886	18.86	18.86	152.06	10	9.00	**9**
7.50	7.95	7.73	1.886	18.86	18.86	194.49	17	13.00	**13**
10.50	10.95	10.73	1.886	18.86	18.86	251.07	22	15.00	**15**
16.50	16.95	16.73	1.902	19.02	19.02	367.32	84	48.00	**32**
18.00	18.45	18.23	1.902	19.02	19.02	495.71	100	47.00	**31**
21.00	21.45	21.23	1.902	19.02	19.02	552.77	100	43.00	**29**
23.50	23.95	23.73	1.902	19.02	19.02	633.60	100	38.00	**27**

Depth of Water Table: 1.00 m

BH: GT- 08

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.885	18.85	18.85		18		
3.00	3.45	3.23	1.885	18.85	18.85	67.15	25	28.00	**22**

Depth of Water Table: 2.75 m

BH: GT- 09

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.881	18.81	18.81		7		
3.00	3.45	3.23	1.881	18.81	18.81	67.01	27	31.00	**23**
4.50	4.95	4.73	1.881	18.81	18.81	109.33	23	22.00	**19**
6.00	6.45	6.23	1.881	18.81	18.81	151.66	27	23.00	**19**
7.50	7.95	7.73	1.899	18.99	18.99	195.83	100	78.00	**47**
10.50	10.95	10.73	1.899	18.99	18.99	252.80	100	69.00	**42**
12.50	12.95	12.73	1.899	18.99	18.99	328.76	52	31.00	**23**
15.50	15.95	15.73	1.899	18.99	18.99	395.23	100	54.00	**35**
16.50	16.95	16.73	1.899	18.99	18.99	461.69	100	49.00	**32**
20.50	20.95	20.73	1.899	18.99	18.99	518.66	100	45.00	**30**

Depth of Water Table: 7.45 m

BH: GT- 10

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.883	18.83	18.83		7		
4.50	4.95	4.73	1.883	18.83	18.83		8		
6.00	6.45	6.23	1.883	18.83	18.83	151.82	11	11.00	**11**
7.50	7.95	7.73	1.883	18.83	18.83	194.18	28	28.00	**28**
10.50	10.95	10.73	1.896	18.96	18.96	252.41	44	30.00	**23**
13.50	13.95	13.73	1.896	18.96	18.96	337.73	76	45.00	**30**

Depth of Water Table: 5.00 m

BH: GT- 12

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.886	18.86	18.86		2		
3.00	3.45	3.23	1.886	18.86	18.86		7		
4.50	4.95	4.73	1.800	18.00	18.00	104.63	3		
6.00	6.45	6.23	1.800	18.00	18.00	145.13	0	0.00	**0**
7.50	7.95	7.73	1.800	18.00	18.00	185.63	0	0.00	**0**
10.50	10.95	10.73	1.800	18.00	18.00	239.63	0	0.00	**0**
13.50	13.95	13.73	1.882	18.82	18.82	335.23	18	11.00	**11**
16.50	16.95	16.73	1.882	18.82	18.82	419.92	22	11.00	**11**
19.50	19.95	19.73	1.882	18.82	18.82	504.61	16	7.00	**7**
22.50	22.95	22.73	1.882	18.82	18.82	589.30	10	4.00	**4**
25.50	25.95	25.73	1.927	19.27	19.27	690.11	75	27.00	**21**
28.50	28.95	28.73	1.927	19.27	19.27	776.82	63	20.00	**18**
31.50	31.95	31.73	1.927	19.27	19.27	863.54	100	28.00	**22**
34.50	34.95	34.73	1.927	19.27	19.27	950.25	91	23.00	**19**
37.50	37.95	37.73	1.927	19.27	19.27	1036.97	100	22.00	**19**
40.50	40.95	40.73	1.927	19.27	19.27	1123.68	100	19.00	**17**

Depth of Water Table: 3.60 m BH: GT- 13

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
2.00	2.45	2.23	1.847	18.47	18.47		3		
3.50	3.95	3.73	1.847	18.47	18.47	79.65	2		
6.00	6.45	6.23	1.847	18.47	18.47	130.44	0	0.00	**0**
8.00	8.45	8.23	1.847	18.47	18.47	195.09	3	3.00	**3**
11.00	11.45	11.23	1.924	19.24	19.24	270.56	100	67.00	**41**
14.00	14.45	14.23	1.924	19.24	19.24	357.14	23	13.00	**13**
17.00	17.45	17.23	1.924	19.24	19.24	443.72	100	50.00	**33**
20.00	20.45	20.23	1.924	19.24	19.24	530.30	100	44.00	**30**
23.00	23.45	23.23	1.924	19.24	19.24	616.88	100	39.00	**27**
26.00	26.45	26.23	1.924	19.24	19.24	703.46	100	35.00	**25**
28.70	29.15	28.93	1.924	19.24	19.24	787.16	100	31.00	**23**
30.00	30.45	30.23	1.924	19.24	19.24	851.61	100	29.00	**22**

Depth of Water Table: 0.00 m

BH: GT- 14

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.850	18.50	18.50	15.96	10	10.00	**10**
3.00	3.45	3.23	1.850	18.50	18.50	65.91	100	100.00	**100**
4.50	4.95	4.73	1.850	18.50	18.50	107.53	40	40.00	**40**
6.00	6.45	6.23	1.850	18.50	18.50	149.16	17	17.00	**17**
7.50	7.95	7.73	1.850	18.50	18.50	190.78	18	18.00	**18**
10.50	10.95	10.73	1.897	18.97	18.97	252.54	95	66.00	**41**
13.50	13.95	13.73	1.897	18.97	18.97	337.90	100	59.00	**37**
16.50	16.95	16.73	1.897	18.97	18.97	423.27	100	52.00	**34**
19.50	19.95	19.73	1.900	19.00	19.00	509.44	43	43.00	**43**
21.50	21.95	21.73	1.927	19.27	19.27	593.76	100	41.00	**28**
24.50	24.95	24.73	1.927	19.27	19.27	661.20	100	37.00	**26**
27.00	27.45	27.23	1.927	19.27	19.27	743.10	100	33.00	**24**

Depth of Water Table: 1.50 m

BH: GT- 15

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.884	18.84	18.84		9		
3.00	3.45	3.23	1.884	18.84	18.84	67.12	10	10.00	**10**
6.50	6.95	6.73	1.885	18.85	18.85	128.42	11	10.00	**10**
7.50	7.95	7.73	1.885	18.85	18.85	203.82	18	14.00	**14**
10.50	10.95	10.73	1.880	18.80	18.80	250.28	27	27.00	**27**
13.50	13.95	13.73	1.880	18.80	18.80	334.88	22	22.00	**22**
16.50	16.95	16.73	1.880	18.80	18.80	419.48	16	16.00	**16**
19.50	19.95	19.73	1.880	18.80	18.80	504.08	19	19.00	**19**
22.50	22.95	22.73	1.928	19.28	19.28	603.71	100	40.00	**28**
25.50	25.95	25.73	1.928	19.28	19.28	690.47	100	36.00	**26**
27.50	27.95	27.73	1.928	19.28	19.28	767.59	100	32.00	**24**

Depth of Water Table: 1.50 m

BH: GT- 16

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.871	18.71	18.71		5		
3.00	3.45	3.23	1.871	18.71	18.71	66.65	6	6.00	**6**
6.50	6.95	6.73	1.871	18.71	18.71	127.46	5	5.00	**5**
7.50	7.95	7.73	1.871	18.71	18.71	202.30	18	18.00	**18**
10.50	10.95	10.73	1.894	18.94	18.94	252.14	60	42.00	**29**
13.50	13.95	13.73	1.894	18.94	18.94	337.37	65	39.00	**27**
16.50	16.95	16.73	1.894	18.94	18.94	422.60	100	52.00	**34**
18.00	18.45	18.23	1.894	18.94	18.94	493.62	100	47.00	**31**
21.00	21.45	21.23	1.894	18.94	18.94	550.44	67	29.00	**22**
24.00	24.45	24.23	1.894	18.94	18.94	635.67	81	31.00	**23**
27.00	27.45	27.23	1.900	19.00	19.00	723.19	100	100.00	**100**
30.00	30.45	30.23	1.900	19.00	19.00	808.69	56	56.00	**56**
33.00	33.45	33.23	1.900	19.00	19.00	894.19	60	60.00	**60**
36.00	36.45	36.23	1.930	19.30	19.30	995.16	100	23.00	**19**
39.00	39.45	39.23	1.930	19.30	19.30	1082.01	100	21.00	**18**
41.00	41.45	41.23	1.930	19.30	19.30	1159.21	91	17.00	**16**

Depth of Water Table: 1.20 m

BH: GT- 17

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.853	18.53	18.53		3		
3.00	3.45	3.23	1.853	18.53	18.53	66.01	4	4.00	**4**
4.50	4.95	4.73	1.853	18.53	18.53	107.71	6	6.00	**6**
6.00	6.45	6.23	1.853	18.53	18.53	149.40	2	2.00	**2**
7.50	7.95	7.73	1.884	18.84	18.84	194.29	48	37.00	**26**
10.50	10.95	10.73	1.884	18.84	18.84	250.81	36	25.00	**20**
13.50	13.95	13.73	1.884	18.84	18.84	335.59	24	14.00	**14**
16.50	16.95	16.73	1.884	18.84	18.84	420.37	25	13.00	**13**
19.50	19.95	19.73	1.884	18.84	18.84	505.15	28	13.00	**13**
22.50	22.95	22.73	1.884	18.84	18.84	589.93	32	13.00	**13**
25.50	25.95	25.73	1.884	18.84	18.84	674.71	34	12.00	**12**
28.50	28.95	28.73	1.884	18.84	18.84	759.49	39	13.00	**13**
31.50	31.95	31.73	1.884	18.84	18.84	844.27	41	12.00	**12**
34.50	34.95	34.73	1.917	19.17	19.17	945.32	65	16.00	**16**
37.50	37.95	37.73	1.917	19.17	19.17	1031.59	70	15.00	**15**
40.50	40.95	40.73	1.917	19.17	19.17	1117.85	100	19.00	**17**
43.50	43.95	43.73	1.917	19.17	19.17	1204.12	100	17.00	**16**

Depth of Water Table: 3.60 m BH: GT- 18

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.853	18.53	18.53		19		
3.00	3.45	3.23	1.853	18.53	18.53		44		
4.50	4.95	4.73	1.853	18.53	18.53	107.71	40	40.00	**40**
6.00	6.45	6.23	1.853	18.53	18.53	149.40	37	37.00	**37**
7.50	7.95	7.73	1.884	18.84	18.84	194.29	38	38.00	**38**
10.50	10.95	10.73	1.884	18.84	18.84	250.81	57	57.00	**57**
13.50	13.95	13.73	1.888	18.88	18.88	336.30	66	39.00	**27**
16.50	16.95	16.73	1.888	18.88	18.88	421.26	57	30.00	**23**
19.50	19.95	19.73	1.888	18.88	18.88	506.22	63	29.00	**22**
22.50	22.95	22.73	1.888	18.88	18.88	591.18	79	32.00	**24**
25.50	25.95	25.73	1.888	18.88	18.88	676.14	87	32.00	**24**
28.50	28.95	28.73	1.888	18.88	18.88	761.10	75	24.00	**20**
31.50	31.95	31.73	1.888	18.88	18.88	846.06	71	20.00	**18**
34.50	34.95	34.73	1.899	18.99	18.99	936.44	100	25.00	**20**
37.50	37.95	37.73	1.899	18.99	18.99	1021.90	100	22.00	**19**
38.50	38.95	38.73	1.899	18.99	18.99	1088.36	100	20.00	**18**

Depth of Water Table: 1.00 m

BH: GT- 19

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.823	18.23	18.23		1		
3.00	3.45	3.23	1.823	18.23	18.23	64.94	3	3.00	**3**
4.50	4.95	4.73	1.823	18.23	18.23	105.96	1	1.00	**1**
6.00	6.45	6.23	1.823	18.23	18.23	146.98	2	2.00	**2**
7.50	7.95	7.73	1.823	18.23	18.23	188.00	1	1.00	**1**
10.50	10.95	10.73	1.922	19.22	19.22	255.87	32	22.00	**19**
11.50	11.95	11.73	1.922	19.22	19.22	323.14	100	61.00	**38**

Depth of Water Table: 3.30 m BH: GT- 20

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.860	18.60	18.60		8		
3.00	3.45	3.23	1.860	18.60	18.60	66.26	12	12.00	**12**
4.50	4.95	4.73	1.860	18.60	18.60	108.11	10	10.00	**10**
6.00	6.45	6.23	1.860	18.60	18.60	149.96	13	13.00	**13**
7.50	7.95	7.73	1.880	18.80	18.80	193.88	100	100.00	**100**
10.50	10.95	10.73	1.880	18.80	18.80	250.28	100	100.00	**100**
13.50	13.95	13.73	1.880	18.80	18.80	334.88	60	60.00	**60**
16.50	16.95	16.73	1.880	18.80	18.80	419.48	75	75.00	**75**
19.50	19.95	19.73	1.880	18.80	18.80	504.08	61	61.00	**61**
22.50	22.95	22.73	1.880	18.80	18.80	588.68	53	53.00	**53**
25.50	25.95	25.73	1.880	18.80	18.80	673.28	55	55.00	**55**
28.50	28.95	28.73	1.929	19.29	19.29	777.63	100	32.00	**24**

Depth of Water Table: 8.10 m

BH: GT- 22

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
3.00	3.45	3.23	1.872	18.72	18.72		14		
4.50	4.95	4.73	1.872	18.72	18.72		14		
6.00	6.45	6.23	1.872	18.72	18.72		17		
7.50	7.95	7.73	1.872	18.72	18.72	193.05	18	18.00	**18**
10.50	10.95	10.73	1.890	18.90	18.90	251.61	73	51.00	**33**
13.50	13.95	13.73	1.890	18.90	18.90	336.66	59	35.00	**25**
16.50	16.95	16.73	1.890	18.90	18.90	421.71	70	36.00	**26**
19.50	19.95	19.73	1.890	18.90	18.90	506.76	55	25.00	**20**
22.50	22.95	22.73	1.890	18.90	18.90	591.81	44	18.00	**17**
25.50	25.95	25.73	1.890	18.90	18.90	676.86	56	20.00	**18**
28.50	28.95	28.73	1.890	18.90	18.90	761.91	55	18.00	**17**
31.50	31.95	31.73	1.890	18.90	18.90	846.96	61	18.00	**17**
34.50	34.95	34.73	1.917	19.17	19.17	945.32	100	25.00	**20**
37.50	37.95	37.73	1.917	19.17	19.17	1031.59	90	20.00	**18**
40.50	40.95	40.73	1.917	19.17	19.17	1117.85	100	19.00	**17**

Depth of Water Table: 5.30 m BH: GT- 24

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
3.00	3.45	3.23	1.919	19.19	19.19		51		
4.50	4.95	4.73	1.919	19.19	19.19	111.54	31	31.00	**31**
6.00	6.45	6.23	1.919	19.19	19.19	154.72	25	25.00	**25**
7.50	7.95	7.73	1.919	19.19	19.19	197.90	14	14.00	**14**
10.50	10.95	10.73	1.919	19.19	19.19	255.47	53	53.00	**53**
13.50	13.95	13.73	1.919	19.19	19.19	341.82	32	19.00	**17**
16.50	16.95	16.73	1.922	19.22	19.22	428.85	100	51.00	**33**
19.50	19.95	19.73	1.922	19.22	19.22	515.34	65	29.00	**22**
22.50	22.95	22.73	1.922	19.22	19.22	601.83	100	40.00	**28**
25.50	25.95	25.73	1.922	19.22	19.22	688.32	100	36.00	**26**
27.50	27.95	27.73	1.922	19.22	19.22	765.20	100	32.00	**24**

Depth of Water Table: 7.00 m

BH: GT- 25

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.903	19.03	19.03		28		
3.00	3.45	3.23	1.903	19.03	19.03		36		
4.50	4.95	4.73	1.903	19.03	19.03		22		
6.00	6.45	6.23	1.903	19.03	19.03	153.43	28	28.00	**28**
7.50	7.95	7.73	1.903	19.03	19.03	196.25	33	33.00	**33**
10.50	10.95	10.73	1.903	19.03	19.03	253.34	23	23.00	**23**
13.50	13.95	13.73	1.903	19.03	19.03	338.97	24	24.00	**24**
16.50	16.95	16.73	1.903	19.03	19.03	424.61	33	33.00	**33**
19.50	19.95	19.73	1.903	19.03	19.03	510.24	38	38.00	**38**
22.50	22.95	22.73	1.919	19.19	19.19	600.89	80	32.00	**24**
25.50	25.95	25.73	1.919	19.19	19.19	687.24	54	19.00	**17**
28.50	28.95	28.73	1.919	19.19	19.19	773.60	100	32.00	**24**
31.50	31.95	31.73	1.919	19.19	19.19	859.95	100	28.00	**22**
33.50	33.95	33.73	1.919	19.19	19.19	936.71	100	25.00	**20**

Depth of Water Table: 0.30 m BH: GT- 26

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.879	18.79	18.79	16.21	8		
3.00	3.45	3.23	1.879	18.79	18.79	66.94	6	6.00	**6**
4.50	4.95	4.73	1.879	18.79	18.79	109.22	4	4.00	**4**
6.00	6.45	6.23	1.879	18.79	18.79	151.49	5	5.00	**5**
7.50	7.95	7.73	1.879	18.79	18.79	193.77	22	22.00	**22**
10.50	10.95	10.73	1.879	18.79	18.79	250.14	8	8.00	**8**
13.50	13.95	13.73	1.920	19.20	19.20	342.00	100	59.00	**37**
16.50	16.95	16.73	1.920	19.20	19.20	428.40	100	52.00	**34**
18.50	18.95	18.73	1.920	19.20	19.20	505.20	100	46.00	**31**

Depth of Water Table: 3.70 m

BH: GT- 27

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.862	18.62	18.62		2		
3.00	3.45	3.23	1.862	18.62	18.62		8		
4.50	4.95	4.73	1.862	18.62	18.62	108.23	3	3.00	**3**
6.00	6.45	6.23	1.862	18.62	18.62	150.12	3	3.00	**3**
7.50	7.95	7.73	1.862	18.62	18.62	192.02	5	5.00	**5**
13.50	13.95	13.73	1.927	19.27	19.27	285.44	73	48.00	**32**
16.50	16.95	16.73	1.927	19.27	19.27	429.96	23	12.00	**12**

Depth of Water Table: 1.50 m

BH: GT- 28

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.891	18.91	18.91		3		
3.00	3.45	3.23	1.891	18.91	18.91	67.37	6	7.00	**7**
4.50	4.95	4.73	1.891	18.91	18.91	109.91	9	9.00	**9**
6.00	6.45	6.23	1.891	18.91	18.91	152.46	12	10.00	**10**
7.50	7.95	7.73	1.918	19.18	19.18	197.79	100	77.00	**46**
10.50	10.95	10.73	1.918	19.18	19.18	255.33	100	69.00	**42**
13.50	13.95	13.73	1.918	19.18	19.18	341.64	100	59.00	**37**
15.00	15.45	15.23	1.918	19.18	19.18	413.57	100	53.00	**34**

Depth of Water Table: 9.70 m

BH: GT- 29

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.800	18.00	18.00		5		
3.00	3.45	3.23	1.910	19.10	19.10		79		
4.50	4.95	4.73	1.910	19.10	19.10		58		
6.00	6.45	6.23	1.910	19.10	19.10		46		
7.50	7.95	7.73	1.910	19.10	19.10	196.97	43	33.00	**24**
10.50	10.95	10.73	1.910	19.10	19.10	254.27	40	28.00	**22**
13.50	13.95	13.73	1.910	19.10	19.10	340.22	41	24.00	**20**
16.50	16.95	16.73	1.910	19.10	19.10	426.17	37	19.00	**17**
19.50	19.95	19.73	1.910	19.10	19.10	512.12	43	20.00	**18**
22.50	22.95	22.73	1.926	19.26	19.26	603.08	100	40.00	**28**
25.50	25.95	25.73	1.926	19.26	19.26	689.75	100	36.00	**26**
27.50	27.95	27.73	1.926	19.26	19.26	766.79	100	32.00	**24**

Depth of Water Table: 4.70 m

BH: GT- 31

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.850	18.50	18.50		15		
3.00	3.45	3.23	1.850	18.50	18.50		19		
4.50	4.95	4.73	1.850	18.50	18.50	107.53	4	4.00	**4**
6.00	6.45	6.23	1.850	18.50	18.50	149.16	6	6.00	**6**
7.50	7.95	7.73	1.850	18.50	18.50	190.78	7	7.00	**7**
10.50	10.95	10.73	1.850	18.50	18.50	246.28	8	8.00	**8**
13.50	13.95	13.73	1.850	18.50	18.50	329.53	12	12.00	**12**
16.50	16.95	16.73	1.912	19.12	19.12	426.62	39	20.00	**18**
19.50	19.95	19.73	1.912	19.12	19.12	512.66	100	46.00	**31**
22.50	22.95	22.73	1.912	19.12	19.12	598.70	100	40.00	**28**
24.50	24.95	24.73	1.912	19.12	19.12	675.18	100	36.00	**26**

Depth of Water Table: 3.90 m

BH: GT- 32

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.886	18.86	18.86		15		
3.00	3.45	3.23	1.886	18.86	18.86		23		
4.50	4.95	4.73	1.850	18.50	18.50	107.53	5	5.00	**5**
6.00	6.45	6.23	1.850	18.50	18.50	149.16	12	12.00	**12**

Depth of Water Table: 5.60 m

BH: GT- 34

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.888	18.88	18.88		15		
3.00	3.45	3.23	1.888	18.88	18.88		17		
4.50	4.95	4.73	1.888	18.88	18.88	109.74	16	16.00	**16**
6.00	6.45	6.23	1.860	18.60	18.60	149.96	9	9.00	**9**
7.50	7.95	7.73	1.860	18.60	18.60	191.81	11	11.00	**11**
10.50	10.95	10.73	1.860	18.60	18.60	247.61	9	9.00	**9**
13.50	13.95	13.73	1.860	18.60	18.60	331.31	20	20.00	**20**

Depth of Water Table: 4.40 m

BH: GT- 35

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.880	18.80	18.80		21		
3.00	3.45	3.23	1.880	18.80	18.80		31		
4.50	4.95	4.73	1.880	18.80	18.80	109.28	35	35.00	**35**
6.00	6.45	6.23	1.880	18.80	18.80	151.58	30	30.00	**30**
7.50	7.95	7.73	1.880	18.80	18.80	193.88	34	34.00	**34**
10.50	10.95	10.73	1.880	18.80	18.80	250.28	29	29.00	**29**
13.50	13.95	13.73	1.907	19.07	19.07	339.68	100	59.00	**37**
16.50	16.95	16.73	1.907	19.07	19.07	425.50	100	52.00	**34**
18.50	18.95	18.73	1.907	19.07	19.07	501.78	100	46.00	**31**

Depth of Water Table: 3.50 m

BH: GT- 36B

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.870	18.70	18.70		22		
3.00	3.45	3.23	1.870	18.70	18.70	66.62	56	56.00	**56**
4.50	4.95	4.73	1.917	19.17	19.17	111.43	100	97.00	**56**
6.00	6.45	6.23	1.917	19.17	19.17	154.56	100	86.00	**51**

Depth of Water Table: 4.80 m

BH: GT- 37

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.881	18.81	18.81		10		
3.00	3.45	3.23	1.881	18.81	18.81		10		
4.50	4.95	4.73	1.819	18.19	18.19	105.73	4	4.00	**4**
7.50	7.95	7.73	1.819	18.19	18.19	160.30	5	5.00	**5**
10.50	10.95	10.73	1.819	18.19	18.19	242.15	8	8.00	**8**
13.50	13.95	13.73	1.819	18.19	18.19	324.01	11	11.00	**11**
15.00	15.45	15.23	1.819	18.19	18.19	392.22	13	13.00	**13**
16.50	16.95	16.73	1.819	18.19	18.19	433.15	15	15.00	**15**
18.00	18.45	18.23	1.819	18.19	18.19	474.08	21	21.00	**21**

Depth of Water Table: 3.30 m

BH: GT- 38

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.820	18.20	18.20		4		
3.00	3.45	3.23	1.820	18.20	18.20	64.84	6	6.00	**6**
4.50	4.95	4.73	1.900	19.00	19.00	110.44	20	19.00	**17**
6.00	6.45	6.23	1.900	19.00	19.00	153.19	24	21.00	**18**
7.50	7.95	7.73	1.900	19.00	19.00	195.94	26	20.00	**18**
10.50	10.95	10.73	1.900	19.00	19.00	252.94	31	21.00	**18**
13.50	13.95	13.73	1.900	19.00	19.00	338.44	19	11.00	**11**
16.50	16.95	16.73	1.900	19.00	19.00	423.94	24	12.00	**12**
19.50	19.95	19.73	1.900	19.00	19.00	509.44	16	7.00	**7**
22.00	22.45	22.23	1.900	19.00	19.00	590.19	100	41.00	**28**
25.00	25.45	25.23	1.900	19.00	19.00	666.19	100	37.00	**26**
27.00	27.45	27.23	1.900	19.00	19.00	742.19	100	33.00	**24**

Depth of Water Table: 5.35 m

BH: GT- 39

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.888	18.88	18.88		100		
3.00	3.45	3.23	1.888	18.88	18.88		100		
4.50	4.95	4.73	1.888	18.88	18.88	109.74	100	97.00	**56**
6.00	6.45	6.23	1.888	18.88	18.88	152.22	30	26.00	**21**
7.50	7.95	7.73	1.888	18.88	18.88	194.70	42	33.00	**24**

Depth of Water Table: 2.62 m

BH: GT- 41

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.900	19.00	19.00		36		
3.00	3.45	3.23	1.900	19.00	19.00	67.69	55	55.00	**55**
4.50	4.95	4.73	1.900	19.00	19.00	110.44	37	37.00	**37**
6.00	6.45	6.23	1.900	19.00	19.00	153.19	41	41.00	**41**
7.50	7.95	7.73	1.900	19.00	19.00	195.94	44	44.00	**44**
10.50	10.95	10.73	1.900	19.00	19.00	252.94	56	56.00	**56**
13.50	13.95	13.73	1.920	19.20	19.20	342.00	100	59.00	**37**
16.50	16.95	16.73	1.920	19.20	19.20	428.40	100	52.00	**34**
19.50	19.95	19.73	1.920	19.20	19.20	514.80	100	45.00	**30**

Depth of Water Table: 2.80 m

BH: GT- 44A

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.921	19.21	19.21		100		
3.00	3.45	3.23	1.921	19.21	19.21	68.44	100	113.00	**64**
4.50	4.95	4.73	1.921	19.21	19.21	111.66	100	96.00	**56**
6.00	6.45	6.23	1.921	19.21	19.21	154.88	100	86.00	**51**

Depth of Water Table: 3.10 m

BH: GT- 44B

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.924	19.24	19.24		100		
2.00	2.45	2.23	1.924	19.24	19.24		100		
3.50	3.95	3.73	1.924	19.24	19.24	82.97	100	106.00	**61**
5.00	5.45	5.23	1.924	19.24	19.24	126.26	100	92.00	**54**
6.50	6.95	6.73	1.924	19.24	19.24	169.55	100	83.00	**49**
8.00	8.45	8.23	1.924	19.24	19.24	212.84	100	75.00	**45**
12.00	12.45	12.23	1.924	19.24	19.24	280.18	100	66.00	**41**
15.50	15.95	15.73	1.924	19.24	19.24	390.81	100	55.00	**35**
18.00	18.45	18.23	1.924	19.24	19.24	482.20	100	48.00	**32**

Depth of Water Table: 1.05 m

BH: GT- 48

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.881	18.81	18.81		13		
3.00	3.45	3.23	1.881	18.81	18.81	67.01	18	20.00	**18**
4.50	4.95	4.73	1.850	18.50	18.50	107.53	21	21.00	**21**
6.00	6.45	6.23	1.850	18.50	18.50	149.16	23	23.00	**23**
7.50	7.95	7.73	1.850	18.50	18.50	190.78	25	25.00	**25**
10.50	10.95	10.73	1.850	18.50	18.50	246.28	31	31.00	**31**
13.50	13.95	13.73	1.927	19.27	19.27	343.25	100	59.00	**37**
16.50	16.95	16.73	1.927	19.27	19.27	429.96	100	51.00	**33**
18.50	18.95	18.73	1.927	19.27	19.27	507.04	100	46.00	**31**

Depth of Water Table: 0.25 m

BH: GT- 49

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.850	18.50	18.50	15.96	25	40	**28**
4.50	4.95	4.73	1.758	17.58	17.58	75.81	2	2.00	**2**
7.50	7.95	7.73	1.758	17.58	17.58	154.92	3	3.00	**3**
10.50	10.95	10.73	1.902	19.02	19.02	253.20	20	14.00	**14**

Depth of Water Table: 2.50 m

BH: GT- 81

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.874	18.74	18.74		2		
3.00	3.45	3.23	1.874	18.74	18.74	66.76	8		
4.50	4.95	4.73	1.874	18.74	18.74	108.93	46	45.00	**30**
6.00	6.45	6.23	1.874	18.74	18.74	151.09	24	21.00	**18**
7.50	7.95	7.73	1.780	17.80	17.80	183.56	3	3.00	**3**
10.50	10.95	10.73	1.900	19.00	19.00	252.94	40	40.00	**40**

Depth of Water Table: 1.60 m

BH: GT- 82

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.876	18.76	18.76		5		
3.00	3.45	3.23	1.876	18.76	18.76	66.83	14	16.00	**16**
4.50	4.95	4.73	1.876	18.76	18.76	109.04	13	13.00	**13**
6.00	6.45	6.23	1.740	17.40	17.40	140.29	3	3.00	**3**

Depth of Water Table: 0.80 m

BH: GT- 83

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.879	18.79	18.79	16.21	16	26.00	**21**
3.00	3.45	3.23	1.741	17.41	17.41	62.02	2	2.00	**2**
4.50	4.95	4.73	1.741	17.41	17.41	101.20	0	0.00	**0**
6.00	6.45	6.23	1.741	17.41	17.41	140.37	1	1.00	**1**
7.50	7.95	7.73	1.741	17.41	17.41	179.54	1	1.00	**1**
10.50	10.95	10.73	1.741	17.41	17.41	231.77	1	1.00	**1**
13.50	13.95	13.73	1.741	17.41	17.41	310.12	2	2.00	**2**
16.50	16.95	16.73	1.919	19.19	19.19	428.18	100	52.00	**34**

Depth of Water Table: 1.00 m

BH: GT- 84

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.874	18.74	18.74		12		
3.00	3.45	3.23	1.720	17.20	17.20	61.28	2	2.00	**2**
4.50	4.95	4.73	1.720	17.20	17.20	99.98	4	4.00	**4**
6.00	6.45	6.23	1.720	17.20	17.20	138.68	3	3.00	**3**
7.50	7.95	7.73	1.931	19.31	19.31	199.13	12	9.00	**9**
10.50	10.95	10.73	1.931	19.31	19.31	257.06	100	69.00	**42**
13.50	13.95	13.73	1.931	19.31	19.31	343.96	17	10.00	**10**
16.50	16.95	16.73	1.931	19.31	19.31	430.85	22	11.00	**11**

Depth of Water Table: 1.60 m

BH: GT- 85

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.872	18.72	18.72		13		
3.00	3.45	3.23	1.872	18.72	18.72	66.69	15	17.00	**16**
4.50	4.95	4.73	1.872	18.72	18.72	108.81	14	14.00	**14**
6.00	6.45	6.23	1.872	18.72	18.72	150.93	14	12.00	**12**
7.50	7.95	7.73	1.800	18.00	18.00	185.63	15	15.00	**15**
10.50	10.95	10.73	1.800	18.00	18.00	239.63	13	13.00	**13**
13.50	13.95	13.73	1.800	18.00	18.00	320.63	42	42.00	**42**
16.50	16.95	16.73	1.800	18.00	18.00	401.63	76	76.00	**76**
18.50	18.95	18.73	1.800	18.00	18.00	473.63	24	24.00	**24**
22.50	22.95	22.73	1.800	18.00	18.00	545.63	32	32.00	**32**
25.50	25.95	25.73	1.800	18.00	18.00	644.63	39	39.00	**39**
28.50	28.95	28.73	1.930	19.30	19.30	778.03	100	32.00	**24**

Depth of Water Table: 0.50 m

BH: GT- 86

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.884	18.84	18.84	16.25	33	53.00	**34**
3.00	3.45	3.23	1.884	18.84	18.84	67.12	15	17.00	**16**
4.50	4.95	4.73	1.884	18.84	18.84	109.51	16	16.00	**16**
7.50	7.95	7.73	1.810	18.10	18.10	159.51	31	31.00	**31**
10.50	10.95	10.73	1.810	18.10	18.10	240.96	22	22.00	**22**
13.50	13.95	13.73	1.810	18.10	18.10	322.41	20	20.00	**20**
16.50	16.95	16.73	1.810	18.10	18.10	403.86	15	15.00	**15**
19.50	19.95	19.73	1.810	18.10	18.10	485.31	51	51.00	**51**

Depth of Water Table: 1.00 m

BH: GT- 86A

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.870	18.70	18.70		4		
3.00	3.45	3.23	1.870	18.70	18.70	66.62	5	6.00	**6**
4.50	4.95	4.73	1.870	18.70	18.70	108.69	9	9.00	**9**
6.00	6.45	6.23	1.900	19.00	19.00	153.19	100	100.00	**100**
7.50	7.95	7.73	1.900	19.00	19.00	195.94	100	100.00	**100**
10.50	10.95	10.73	1.900	19.00	19.00	252.94	100	100.00	**100**
13.50	13.95	13.73	1.900	19.00	19.00	338.44	100	100.00	**100**
16.50	16.95	16.73	1.900	19.00	19.00	423.94	100	100.00	**100**
19.50	19.95	19.73	1.900	19.00	19.00	509.44	100	100.00	**100**

Depth of Water Table: 1.00 m

BH: GT- 87

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.880	18.80	18.80		1		
3.50	3.95	3.73	1.880	18.80	18.80	71.68	9	10.00	**10**
4.50	4.95	4.73	1.880	18.80	18.80	118.68	5	5.00	**5**
6.00	6.45	6.23	1.880	18.80	18.80	151.58	33	28.00	**22**
7.50	7.95	7.73	1.880	18.80	18.80	193.88	95	74.00	**45**
10.50	10.95	10.73	1.880	18.80	18.80	250.28	28	19.00	**17**
12.50	12.95	12.73	1.880	18.80	18.80	325.48	100	61.00	**38**
16.50	16.95	16.73	1.900	19.00	19.00	404.94	10	10.00	**10**
19.50	19.95	19.73	1.900	19.00	19.00	509.44	8	8.00	**8**
22.50	22.95	22.73	1.900	19.00	19.00	594.94	18	18.00	**18**
25.50	25.95	25.73	1.900	19.00	19.00	680.44	21	21.00	**21**

Depth of Water Table: 2.95 m

BH: GT- 87A

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
3.00	3.45	3.23	1.921	19.21	19.21		10		
4.50	4.95	4.73	1.921	19.21	19.21	111.66	9	9.00	**9**
6.00	6.45	6.23	1.921	19.21	19.21	154.88	15	13.00	**13**
7.50	7.95	7.73	1.930	19.30	19.30	199.03	100	100.00	**100**
10.50	10.95	10.73	1.930	19.30	19.30	256.93	35	35.00	**35**
13.50	13.95	13.73	1.930	19.30	19.30	343.78	53	53.00	**53**

Depth of Water Table: 1.00 m

BH: GT- 88

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.875	18.75	18.75		6		
3.50	3.95	3.73	1.875	18.75	18.75	71.48	11	12.00	**12**
4.50	4.95	4.73	1.875	18.75	18.75	118.36	13	12.00	**12**
6.00	6.45	6.23	1.910	19.10	19.10	153.99	50	50.00	**50**
7.50	7.95	7.73	1.910	19.10	19.10	196.97	100	100.00	**100**
10.50	10.95	10.73	1.910	19.10	19.10	254.27	100	100.00	**100**
12.50	12.95	12.73	1.880	18.80	18.80	325.48	16	16.00	**16**
14.50	14.95	14.73	1.880	18.80	18.80	381.88	22	22.00	**22**
19.50	19.95	19.73	1.880	18.80	18.80	466.48	21	21.00	**21**
22.50	22.95	22.73	1.880	18.80	18.80	588.68	17	17.00	**17**

Depth of Water Table: 4.00 m

BH: GT- 89

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.909	19.09	19.09		24		
3.50	3.95	3.73	1.909	19.09	19.09		100		
4.50	4.95	4.73	1.915	19.15	19.15	120.88	100	94.00	**55**
6.00	6.45	6.23	1.900	19.00	19.00	153.19	40	40.00	**40**
7.50	7.95	7.73	1.924	19.24	19.24	198.41	100	77.00	**46**
10.50	10.95	10.73	1.924	19.24	19.24	256.13	100	69.00	**42**
13.50	13.95	13.73	1.924	19.24	19.24	342.71	100	59.00	**37**
16.50	16.95	16.73	1.924	19.24	19.24	429.29	100	51.00	**33**

Depth of Water Table: 1.50 m

BH: GT- 90

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.850	18.50	18.50		5		
3.00	3.45	3.23	1.850	18.50	18.50	65.91	16	16.00	**16**
4.50	4.95	4.73	1.850	18.50	18.50	107.53	29	29.00	**29**
6.00	6.45	6.23	1.850	18.50	18.50	149.16	25	25.00	**25**
7.50	7.95	7.73	1.905	19.05	19.05	196.45	38	29.00	**22**
10.50	10.95	10.73	1.905	19.05	19.05	253.60	44	30.00	**23**

Depth of Water Table: 1.50 m

BH: GT- 91

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.881	18.81	18.81		7		
3.00	3.45	3.23	1.881	18.81	18.81	67.01	14	16.00	**16**
4.50	4.95	4.73	1.881	18.81	18.81	109.33	15	15.00	**15**
6.00	6.45	6.23	1.881	18.81	18.81	151.66	32	28.00	**22**
7.50	7.95	7.73	1.881	18.81	18.81	193.98	41	32.00	**24**
9.00	9.45	9.23	1.900	19.00	19.00	238.69	100	100.00	**100**
10.50	10.95	10.73	1.900	19.00	19.00	281.44	100	100.00	**100**
13.50	13.95	13.73	1.900	19.00	19.00	338.44	33	33.00	**33**

Depth of Water Table: 0.60 m BH: GT- 92

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.885	18.85	18.85	16.26	13	21.00	**18**
3.00	3.45	3.23	1.885	18.85	18.85	67.15	14	16.00	**16**
4.50	4.95	4.73	1.885	18.85	18.85	109.57	15	15.00	**15**
6.00	6.45	6.23	1.885	18.85	18.85	151.98	17	15.00	**15**
7.50	7.95	7.73	1.885	18.85	18.85	194.39	15	12.00	**12**
10.50	10.95	10.73	1.885	18.85	18.85	250.94	25	17.00	**16**
13.50	13.95	13.73	1.885	18.85	18.85	335.77	31	18.00	**17**
16.50	16.95	16.73	1.885	18.85	18.85	420.59	30	16.00	**16**
19.50	19.95	19.73	1.885	18.85	18.85	505.42	32	15.00	**15**
22.50	22.95	22.73	1.909	19.09	19.09	597.76	100	40.00	**28**
25.50	25.95	25.73	1.909	19.09	19.09	683.66	100	36.00	**26**
28.50	28.95	28.73	1.900	19.00	19.00	765.94	32	32.00	**32**
31.50	31.95	31.73	1.900	19.00	19.00	851.44	37	37.00	**37**
34.50	34.95	34.73	1.921	19.21	19.21	947.29	75	19.00	**17**
37.50	37.95	37.73	1.921	19.21	19.21	1033.74	100	22.00	**19**
39.50	39.95	39.73	1.921	19.21	19.21	1110.58	100	20.00	**18**
42.50	42.95	42.73	1.921	19.21	19.21	1177.81	100	18.00	**17**

Depth of Water Table: 1.00 m

BH: GT- 93

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.876	18.76	18.76		6		
3.00	3.45	3.23	1.876	18.76	18.76	66.83	8	9.00	**9**
4.50	4.95	4.73	1.876	18.76	18.76	109.04	10	10.00	**10**
6.00	6.45	6.23	1.876	18.76	18.76	151.25	28	24.00	**20**
7.50	7.95	7.73	1.876	18.76	18.76	193.46	9	7.00	**7**
10.50	10.95	10.73	1.876	18.76	18.76	249.74	20	14.00	**14**
13.50	13.95	13.73	1.810	18.10	18.10	322.41	12	12.00	**12**
16.50	16.95	16.73	1.810	18.10	18.10	403.86	13	13.00	**13**
19.50	19.95	19.73	1.810	18.10	18.10	485.31	14	14.00	**14**
22.50	22.95	22.73	1.810	18.10	18.10	566.76	21	21.00	**21**

Depth of Water Table: 1.50 m

BH: GT- 95

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.871	18.71	18.71		5		
3.00	3.45	3.23	1.871	18.71	18.71	66.65	9	10.00	**10**
4.50	4.95	4.73	1.871	18.71	18.71	108.75	9	9.00	**9**
6.00	6.45	6.23	1.871	18.71	18.71	150.85	11	10.00	**10**
7.50	7.95	7.73	1.871	18.71	18.71	192.95	10	8.00	**8**
13.50	13.95	13.73	1.914	19.14	19.14	283.51	23	23.00	**23**
16.50	16.95	16.73	1.914	19.14	19.14	427.06	30	30.00	**30**
19.50	19.95	19.73	1.926	19.26	19.26	516.41	100	45.00	**30**
22.50	22.95	22.73	1.926	19.26	19.26	603.08	100	40.00	**28**
25.50	25.95	25.73	1.926	19.26	19.26	689.75	100	36.00	**26**

Depth of Water Table: 0.50 m

BH: GT- 97

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.894	18.94	18.94	16.34	12		
3.00	3.45	3.23	1.894	18.94	18.94	67.47	11	11.00	**11**
6.00	6.45	6.23	1.894	18.94	18.94	124.29	4	4.00	**4**
10.50	10.95	10.73	1.880	18.80	18.80	222.08	12	9.00	**9**
13.50	13.95	13.73	1.880	18.80	18.80	334.88	15	9.00	**9**
16.50	16.95	16.73	1.880	18.80	18.80	419.48	13	7.00	**7**
20.00	20.45	20.23	1.880	18.80	18.80	508.78	100	46.00	**31**

Depth of Water Table: 2.30 m

BH: GT- 98

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.884	18.84	18.84		17		
3.00	3.45	3.23	1.884	18.84	18.84	67.12	18	20.00	**18**
4.50	4.95	4.73	1.884	18.84	18.84	109.51	18	17.00	**16**
6.50	6.95	6.73	1.833	18.33	18.33	152.37	2	2.00	**2**
7.50	7.95	7.73	1.833	18.33	18.33	198.19	6	6.00	**6**
10.50	10.95	10.73	1.833	18.33	18.33	244.02	18	18.00	**18**

Depth of Water Table: 1.90 m

BH: GT- 99

CORRECTION FOR STANDARD PENETRATION TEST VALUES

Starting Depth(m)	Ending Depth(m)	Average Depth (m)	Bulk Density (gm/cc)	Bulk Density (kN/m3)	Submerged Density	Effective Overburden Pressure (kN/m2)	Field N values	N' (after overburden correction)	N" (after Dilatancy correction)
1.50	1.95	1.73	1.850	18.50	18.50		19		
3.00	3.45	3.23	1.885	18.85	18.85	67.15	17	19.00	**17**
4.50	4.95	4.73	1.885	18.85	18.85	109.57	28	27.00	**21**
6.00	6.45	6.23	1.885	18.85	18.85	151.98	31	27.00	**21**
7.50	7.95	7.73	1.885	18.85	18.85	194.39	15	12.00	**12**
10.50	10.95	10.73	1.885	18.85	18.85	250.94	23	16.00	**16**
12.50	12.95	12.73	1.885	18.85	18.85	326.34	100	61.00	**38**
15.50	15.95	15.73	1.885	18.85	18.85	392.32	100	54.00	**35**
18.50	18.95	18.73	1.885	18.85	18.85	477.14	100	48.00	**32**
20.00	20.45	20.23	1.885	18.85	18.85	547.83	100	43.00	**29**

M/s ANAND RAJ INFRATECH PVT. LTD.

Project: Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

CORRECTED SPT "N" VALUE

BH	Depth (m)		Depth (m)	Average γ_{bulk} (ton/m$^{3)}$)	P_o (kg/cm^2)	Correction factor as per IS 2131-1981,fig-1	Observed Average N-Value	N-Value Corrected for		Corrected N value	
	From	To						Overburden	Dilatancy		
GT 54	0.00	2.00	2.00	1.85	0.170	1.70	13	22	19	19	
	2.00	6.00	6.00	1.85	0.51	1.20	28	34	24	24	
	6.00	26.50	26.50	2.00	2.56	0.69	70	48	31	31	
	26.50	28.50	28.50	2.00	2.76	0.67	100	67	41	41	
GT57B	0.00	3.50	3.50	1.85	0.30	NA	7	NA	NA	NA	
	3.50	7.00	7.00	1.80	0.58	1.18	9	11	11	11	
GT 58A	0.00	13.00	13.00	1.88	1.14	NA	10	NA	NA	NA	
	13.00	15.00	15.00	1.90	1.32	0.92	32	29	22	22	
GT60	0.00	2.00	2.00	1.70	0.14	1.80	47	85	50	50	
	2.00	16.00	16.00	1.90	1.40	NA	23	NA	NA	NA	
	16.00	21.50	21.50	2.00	1.95	0.80	100	80	48	48	
GT61	0.00	2.50	2.50	1.80	0.20	NA	1	NA	NA	NA	
	2.50	13.00	13.00	1.80	1.04	1.00	8	8	8	8	
GT62	0.00	6.00	6.00	1.84	0.50	NA	12	NA	NA	NA	
	6.00	10.15	10.15	1.88	0.87	1.06	17	18.0	17	17	
GT 63	0.00	7.50	7.50	1.75	0.56	NA	1	NA	NA	NA	
	7.50	12.50	12.50	1.81	0.97	1.02	10	10	10	10	
GT 66	0.00	10.50	10.50	FILLED UP GROUND							
	10.50	17.00	17.00	2.00	1.70	0.83	100	83	49	49	
GT 68	0.00	2.00	2.00	1.90	0.18	1.70	16	27	21	21	
	2.00	4.50	4.50	1.95	0.42	1.24	32	40	27	27	
GT 69A	0.00	8.00	8.00	1.86	0.69	NA	11	NA	NA	NA	
	8.00	10.20	10.20	2.00	0.91	1.04	45	47	31	31	
GT 55A	0.00	4.00	4.00	1.88	0.35	NA	14	NA	NA	NA	
	4.00	10.50	10.50	1.80	0.87	1.06	7	7	7	7	
GT 74	0.00	3.00	3.00	2.10	0.33	1.40	100	140	78	78	
	3.00	8.80	8.80	1.90	0.85	NA	14	NA	NA	NA	

M/s ANAND RAJ INFRATECH PVT. LTD.

Project: Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

CORRECTED SPT "N" VALUE

BH	Depth (m)		Depth (m)	Average γ_{bulk} (ton/m$^{3)}$)	P$_o$ (kg/cm^2)	Correction factor as per IS 2131-1981,fig-1	Observed Average N-Value	N-Value Corrected for		Corrected N value	
	From	To						Overburden	Dilatancy		
GT 75A	0.00	7.00	7.00	1.70	0.49	NA	9	NA	NA	NA	
	7.00	26.40	26.40	1.75	1.95	0.80	15	12	12	12	
GT 78	0.00	8.40	8.40	1.95	0.80	1.10	24	26	21	21	
	8.40	25.00	25.00	1.96	2.39	NA	17	NA	NA	NA	
	25.00	30.50	30.50	1.88	2.88	0.66	48	32	23	23	
	30.50	40.70	40.70	1.95	3.84	NA	49	NA	NA	NA	
GT 79	0.00	7.00	7.00	1.65	0.46	1.22	7	9	9	9	
	7.00	42.50	42.50	1.93	3.76	NA	18	NA	NA	NA	
GT 80	0.00	4.00	4.00	1.55	0.22	1.52	10	15	15	15	
	4.00	15.50	15.50	1.95	1.31	0.92	19	NA	NA	NA	
	15.50	25.00	25.00	2.00	2.26	0.74	41	NA	NA	NA	
	25.00	41.90	41.90	1.95	3.87	0.57	52	29.7	22	22	
GT 101A	0.00	6.00	6.00	1.90	0.54	NA	9	NA	NA	NA	
	6.00	7.50	7.50	1.80	0.66	1.14	5	6	6	6	
GT 103A	0.00	10.00	10.00	1.92	0.92	NA	12	NA	NA	NA	
	10.00	18.00	18.00	1.70	1.48	0.89	25	22	19	19	
104	0.00	9.00	9.00	1.92	0.83	NA	16	NA	NA	NA	
	9.00	19.50	19.50	2.00	1.88	0.81	100	81	48	48	
105 A	0.00	7.50	7.50	1.95	0.71	1.12	36	40	28	28	
	7.50	15.00	15.00	2.00	1.46	0.89	100	89	52	52	
106	0.00	10.50	10.50	1.57	0.60	1.18	20	24	19	19	
	10.50	22.50	22.50	1.85	1.62	0.85	41	35	25	25	
107A	0.00	10.50	10.50	1.69	0.72	1.12	12	13	13	13	
GT 108A	0.00	1.60	1.60	1.80	0.13	NA	16	NA	NA	NA	
	1.60	8.00	8.00	1.75	0.61	1.16	14	16	16	16	
	8.00	16.50	16.50	1.92	1.39	NA	13	NA	NA	NA	
	16.50	28.50	28.50	2.00	2.59	0.69	67	46	30	30	

M/s ANAND RAJ INFRATECH PVT. LTD.

Project: Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

CORRECTED SPT "N" VALUE

BH	Depth (m)		Depth (m)	Average γ_{bulk} (ton/m$^{3)}$)	P_o (kg/cm^2)	Correction factor as per IS 2131-1981,fig-1	Observed Average N-Value	N-Value Corrected for		Corrected N value	
	From	To						Overburden	Dilatancy		
GT 111A	0.00	4.50	4.50	1.66	0.30	1.45	5	7	7	7	
	4.50	10.00	10.00	1.72	0.69	1.14	18	21	18	18	
	10.00	13.00	13.00	2.20	1.05	NA	-	NA	NA	NA	
	13.00	28.00	28.00	1.85	2.33	0.73	38	28	21	21	
	28.00	40.50	40.50	2.00	3.58	0.60	71	42	29	29	
GT 112	0.00	17.00	17.00	1.79	1.34	0.92	13	12	12	12	
	17.00	23.00	23.00	2.00	1.94	0.80	100	80	48	48	
	23.00	28.00	28.00	1.95	2.42	NA	22	NA	NA	NA	
	28.00	44.00	44.00	1.88	3.83	0.58	33	19	17	17	
GT59	0.00	3.00	3.00	2.00	0.30	1.40	100	140	78	78	
GT 100A	0.00	7.50	7.50	1.78	0.59	1.18	23	27	21	21	
	7.50	10.50	10.50	1.78	0.82	1.08	38	41	28	28	
GT 109	0.00	4.50	4.50	1.80	0.36	1.38	5	7	7	7	
	4.50	13.50	13.50	1.90	1.17	NA	8	NA	NA	NA	
	13.50	21.00	21.00	1.97	1.90	0.81	83	67	41	41	
GT 110	0.00	7.50	7.50	1.69	0.52	1.20	6	7	7	7	
	7.50	16.50	16.50	1.82	1.26	0.94	19	18	16	16	
	16.50	27.00	27.00	2.00	2.31	0.73	126	91	53	53	
GT 113	0.00	6.00	6.00	1.75	0.45	1.22	11	13	13	13	
	6.00	9.00	9.00	1.95	0.74	NA	14	NA	NA	NA	
	9.00	19.00	19.00	1.90	1.64	0.85	32	27	21	21	
	19.00	22.00	22.00	1.96	1.92	NA	19	NA	NA	NA	
	22.00	36.00	36.00	1.95	3.25	0.62	135	84	49	49	
GT 114	0.00	15.50	15.50	1.86	1.33	0.92	15	14	14	14	
	15.50	30.50	30.50	1.91	2.70	NA	17	NA	NA	NA	
	30.50	36.00	36.00	2.00	3.25	0.62	90	56	36	36	

M/s ANAND RAJ INFRATECH PVT. LTD.

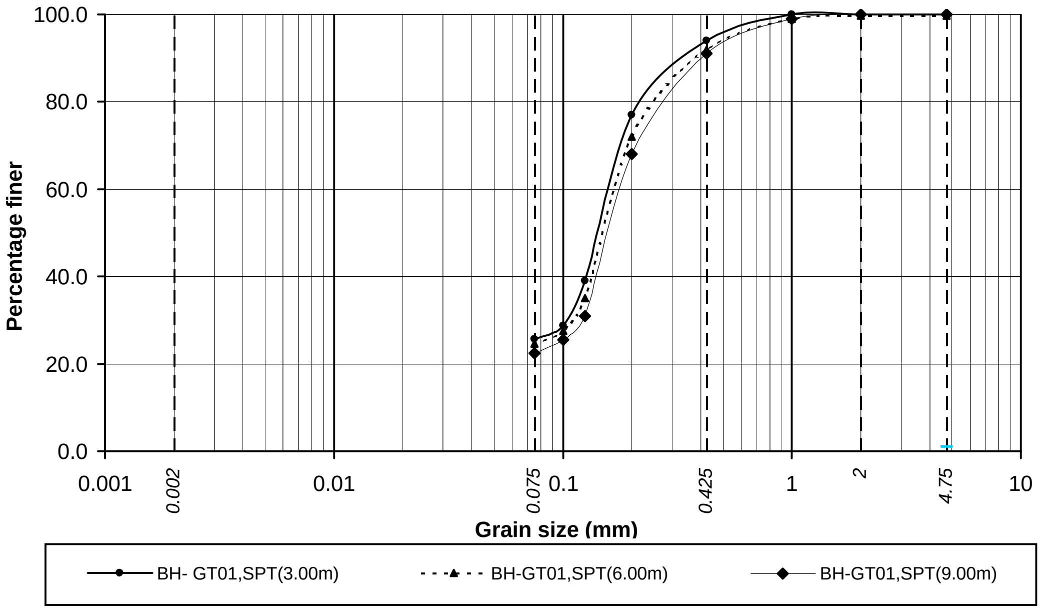
Project: Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

CORRECTED SPT "N" VALUE

BH	Depth (m)		Depth (m)	Average γ_{bulk} (ton/m$^{3)}$)	P$_o$ (kg/cm^2)	Correction factor as per IS 2131-1981,fig-1	Observed Average N-Value	N-Value Corrected for		Corrected N value
	From	To						Overburden	Dilatancy	
GT 115	0.00	7.50	7.50	1.80	0.60	1.16	17	20	17	17
	7.50	10.50	10.50	2.00	0.90	NA	-	NA	NA	NA
	10.50	16.00	16.00	2.00	1.45	0.89	100	89	52	52
GT 116	0.00	10.00	10.00	1.77	0.77	1.10	11	12	12	12
	10.00	15.00	15.00	1.90	1.35	0.92	100	92	54	54
GT 117	0.00	7.00	7.00	1.90	0.63	1.16	32	37	26	26
GT 118	0.00	3.00	3.00	1.77	0.23	1.52	8	12	12	12
	3.00	6.00	6.00	1.88	0.50	NA	12	NA	NA	NA
	6.00	10.00	10.00	1.88	0.85	1.08	12	13	13	13
GT 119A	0.00	1.50	1.50	-	-	-	-	-	-	-
	1.50	13.50	13.50	1.95	1.28	NA	18	NA	NA	NA
	13.50	17.50	17.50	1.95	1.66	0.84	100	84	50	50
GT 120A	0.00	4.50	4.50	1.78	0.35	1.38	7	10	10	10
	4.50	5.50	5.50	1.78	0.43	NA	6	NA	NA	NA
	5.50	8.50	8.50	1.72	0.65	1.16	7	8	8	8
GT 122	0.00	6.00	6.00	1.78	0.47	1.22	10	12	12	12
	6.00	19.50	19.50	1.95	1.75	NA	14	NA	NA	NA
	19.50	21.00	21.00	1.90	1.89	0.81	17	14	14	14
GT 123A	0.00	14.50	14.50	1.75	1.09	0.98	12	12	12	12
	14.50	16.00	16.00	2.00	1.24	0.95	50	48	31	31

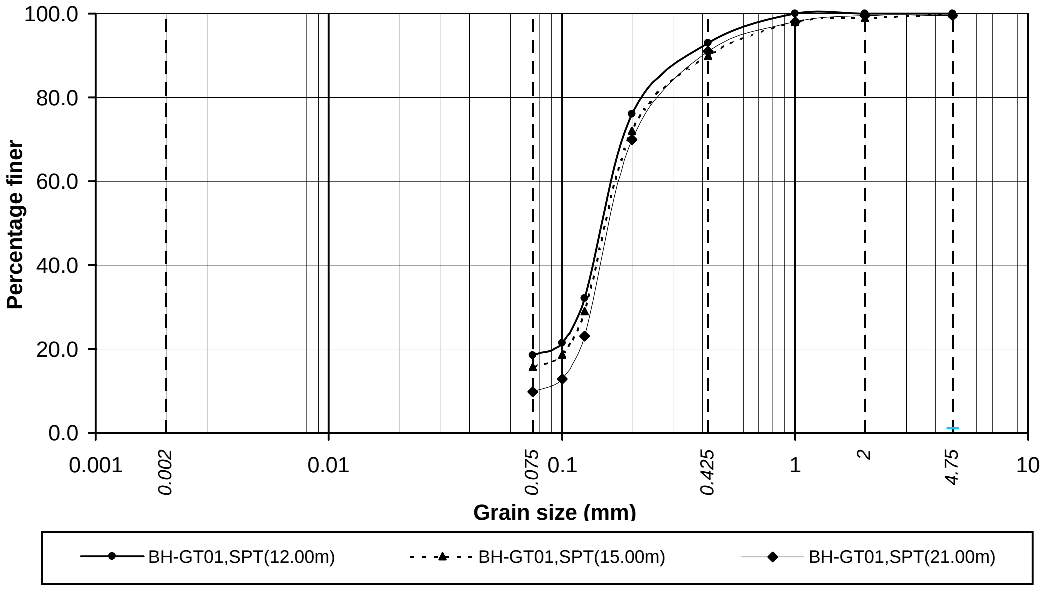
"NA" stands for Not Applicable due to existence of cohesive strata

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH- GT01,SPT(3.00m)	25.7		74.30	0.0
BH-GT01,SPT(6.00m)	24.6		75.10	0.3
BH-GT01,SPT(9.00m)	22.5		77.50	0.0

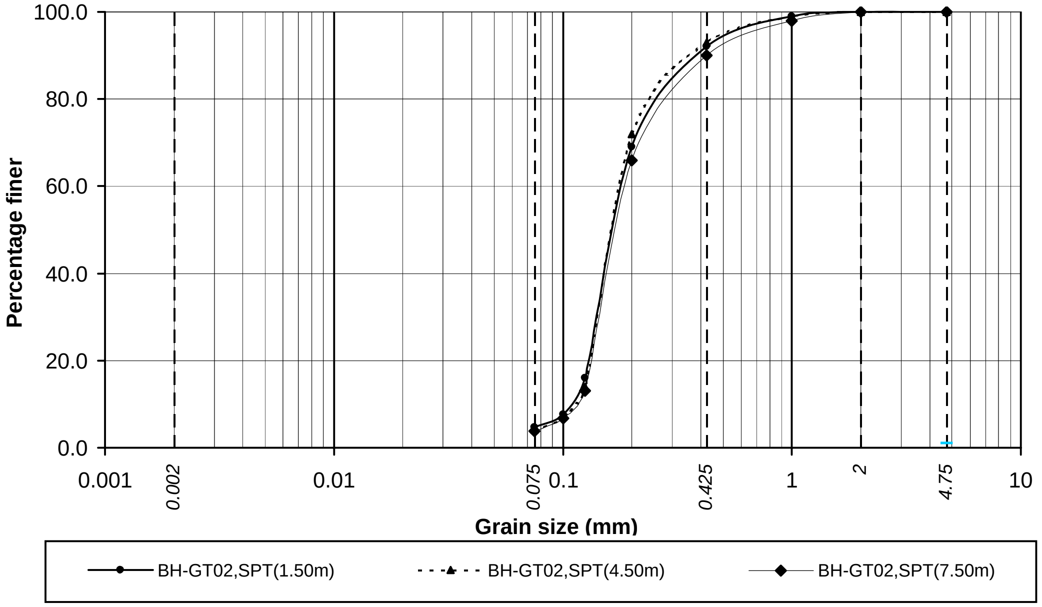
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT01,SPT(12.00m)	18.4		81.60	0.0
BH-GT01,SPT(15.00m)	15.7		84.20	0.1
BH-GT01,SPT(21.00m)	9.8		89.70	0.5

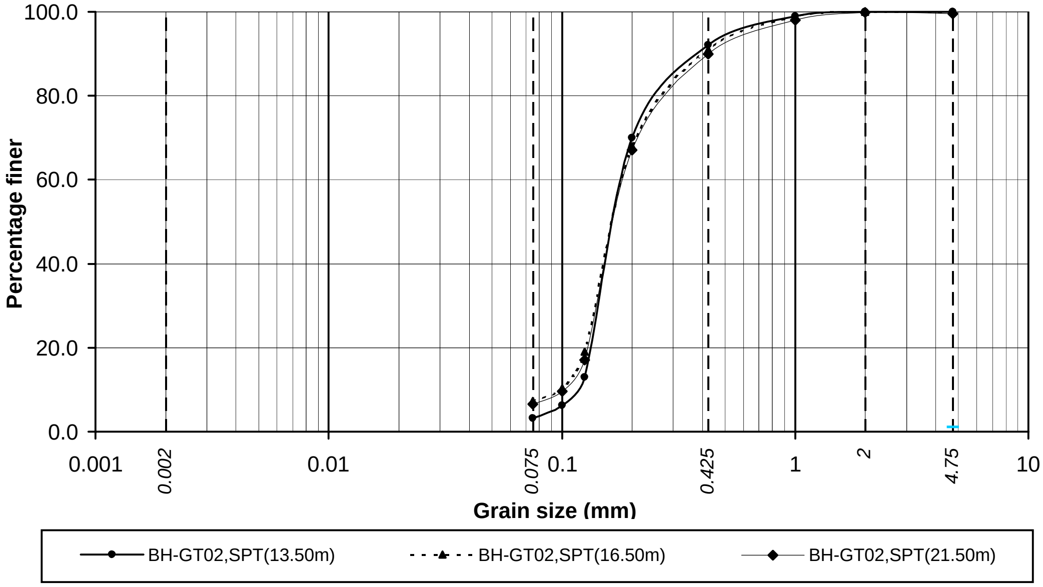
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT02,SPT(1.50m)	4.7		95.30	0.0
BH-GT02,SPT(4.50m)	4.1		95.90	0.0
BH-GT02,SPT(7.50m)	3.8		96.20	0.0

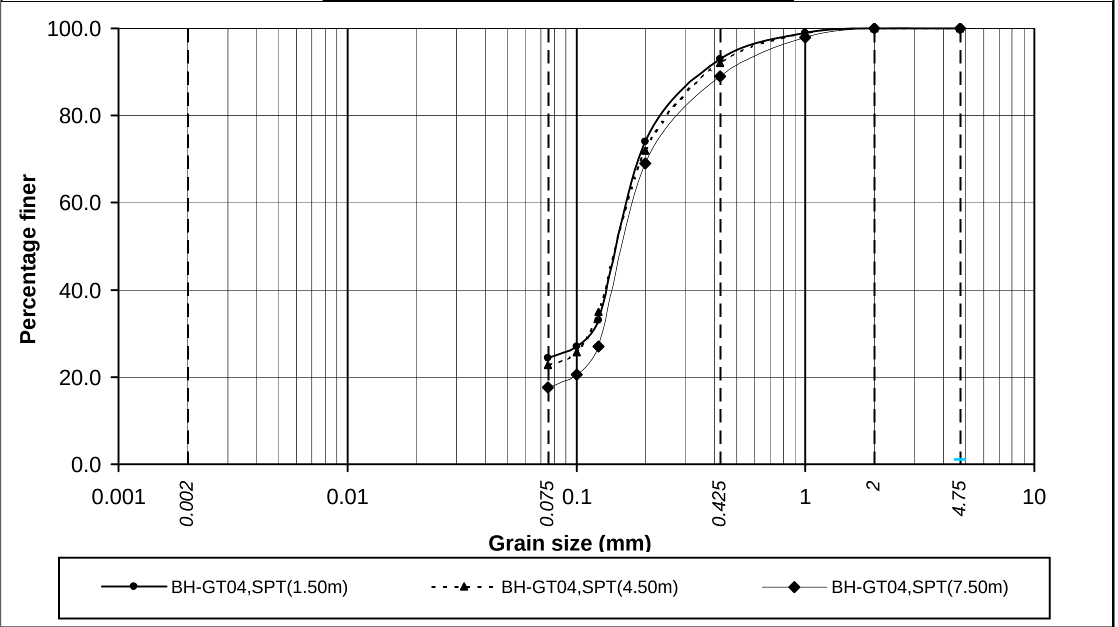
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT02,SPT(13.50m)	3.2		96.80	0.0
BH-GT02,SPT(16.50m)	7.3		92.70	0.0
BH-GT02,SPT(21.50m)	6.6		93.00	0.4

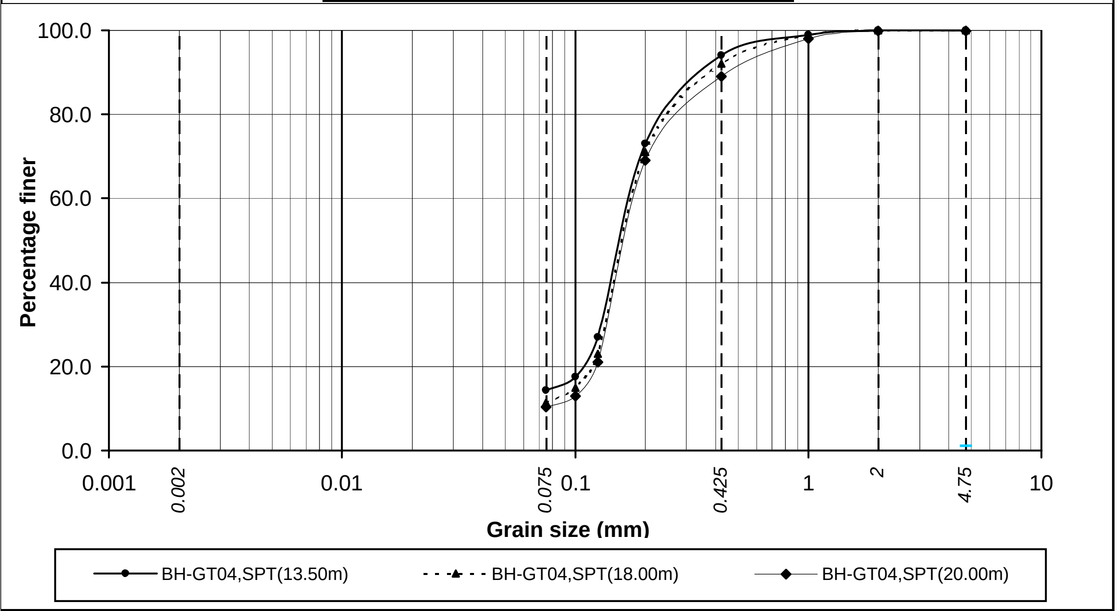
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT04,SPT(1.50m)	24.4		75.60	0.0
BH-GT04,SPT(4.50m)	22.7		77.30	0.0
BH-GT04,SPT(7.50m)	17.6		82.40	0.0

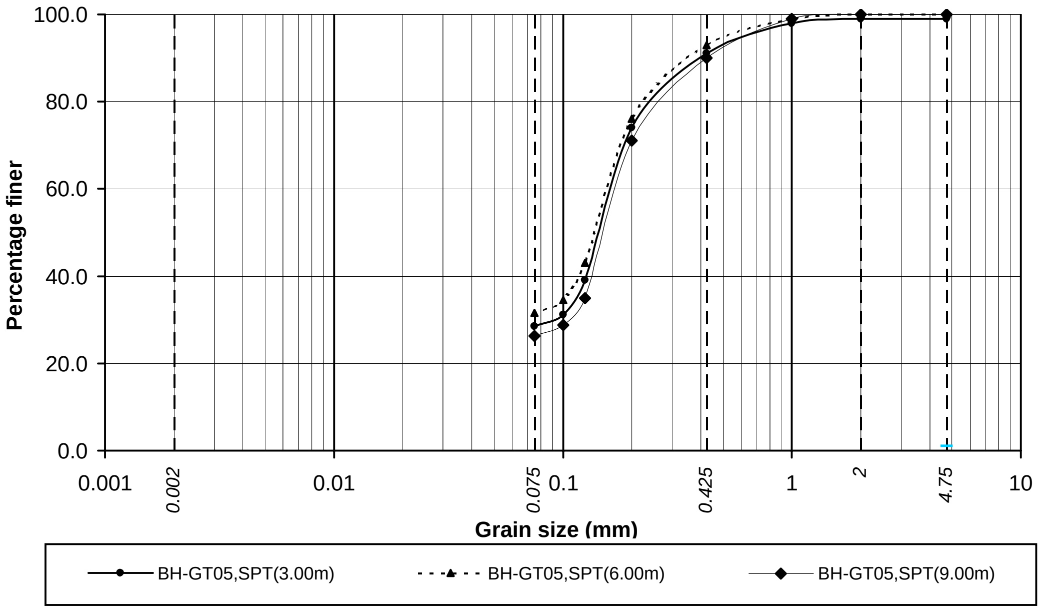
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT04,SPT(13.50m)	14.3		85.70	0.0
BH-GT04,SPT(18.00m)	11.5		88.50	0.0
BH-GT04,SPT(20.00m)	10.4		89.40	0.2

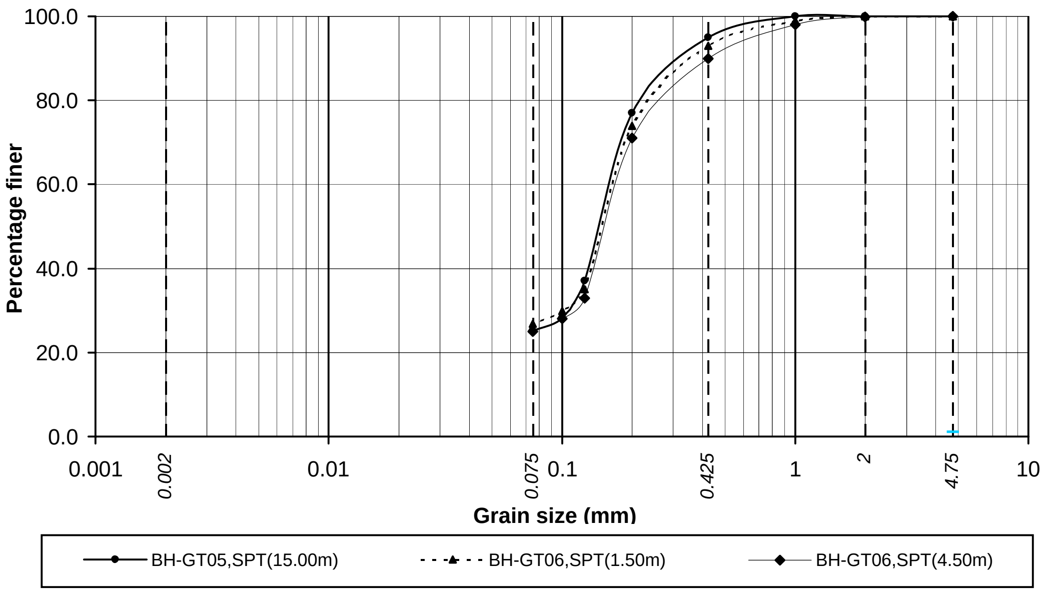
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT05,SPT(3.00m)	28.5		70.50	1.0
BH-GT05,SPT(6.00m)	31.6		68.40	0.0
BH-GT05,SPT(9.00m)	26.3		73.70	0.0

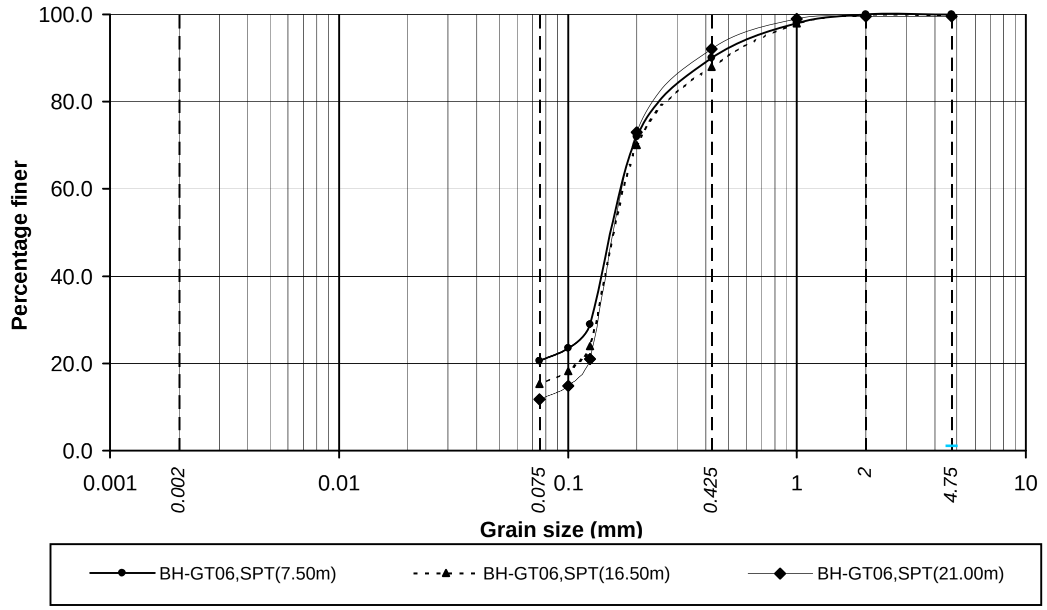
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT05,SPT(15.00m)	25.2		74.80	0.0
BH-GT06,SPT(1.50m)	26.9		73.10	0.0
BH-GT06,SPT(4.50m)	25.0		75.00	0.0

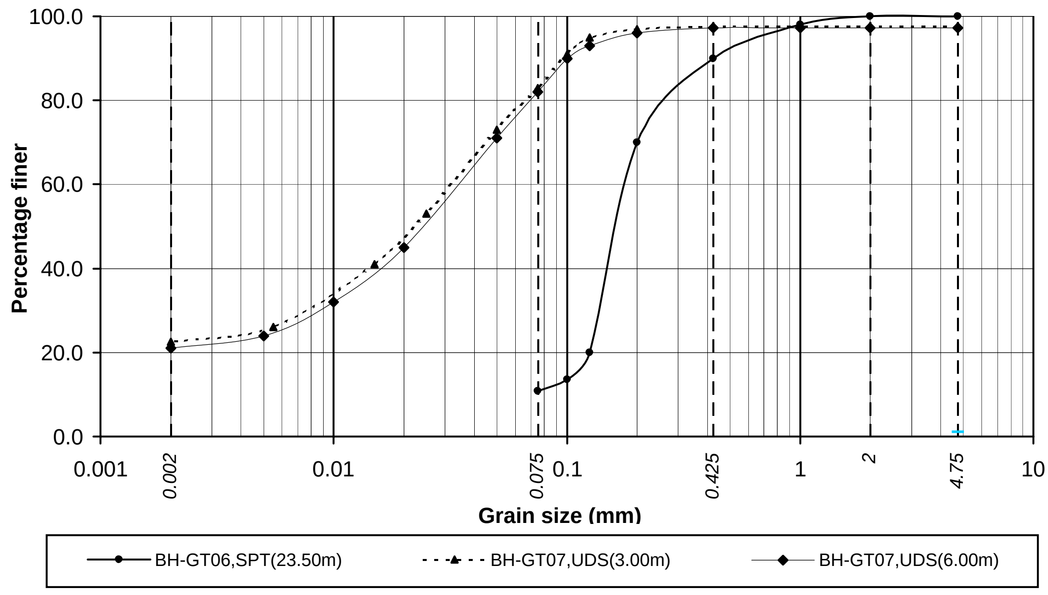
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT06,SPT(7.50m)	20.6		79.40	0.0
BH-GT06,SPT(16.50m)	15.2		84.70	0.1
BH-GT06,SPT(21.00m)	11.8		87.80	0.4

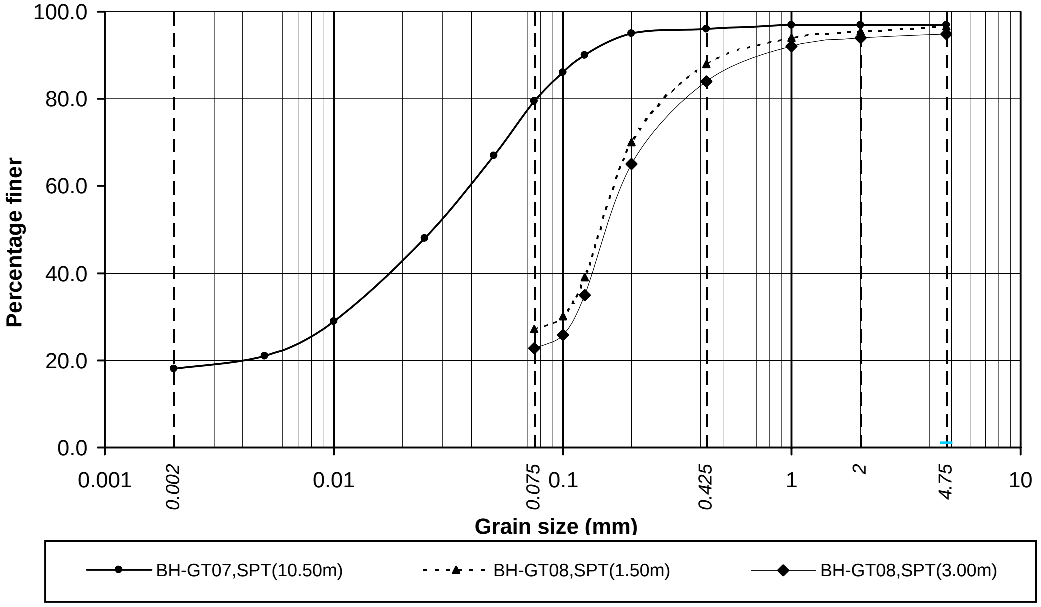
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT06,SPT(23.50m)	10.8		89.20	0.0
BH-GT07,UDS(3.00m)	22.5	60.5	14.70	2.3
BH-GT07,UDS(6.00m)	21.1	60.9	15.20	2.8

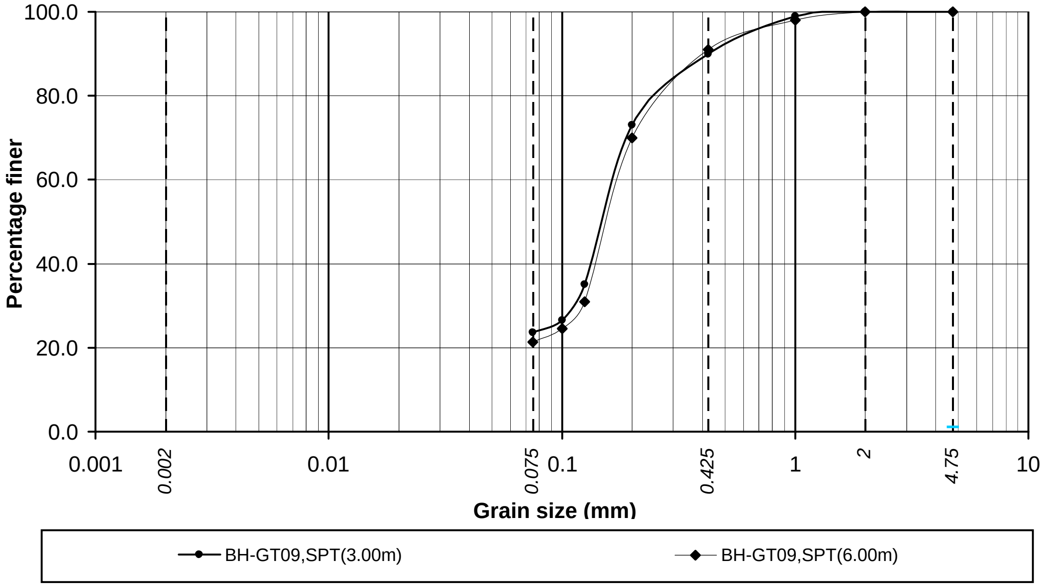
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT07,SPT(10.50m)	18.0	61.4	17.50	3.1
BH-GT08,SPT(1.50m)	27.1		69.50	3.4
BH-GT08,SPT(3.00m)	22.8		72.10	5.1

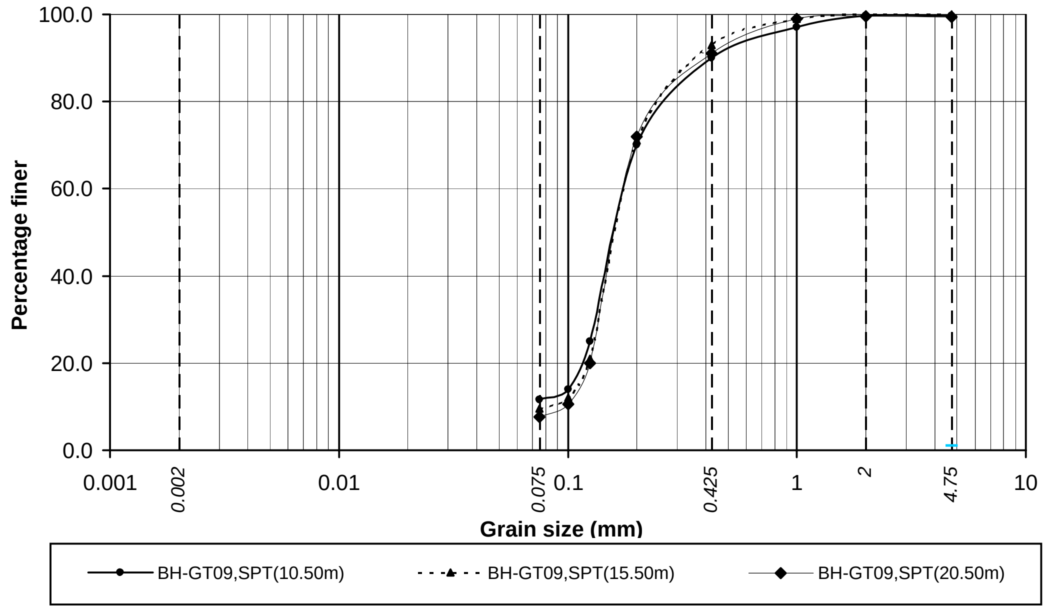
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT09,SPT(3.00m)	23.6		76.40	0.0
BH-GT09,SPT(6.00m)	21.4		78.60	0.0

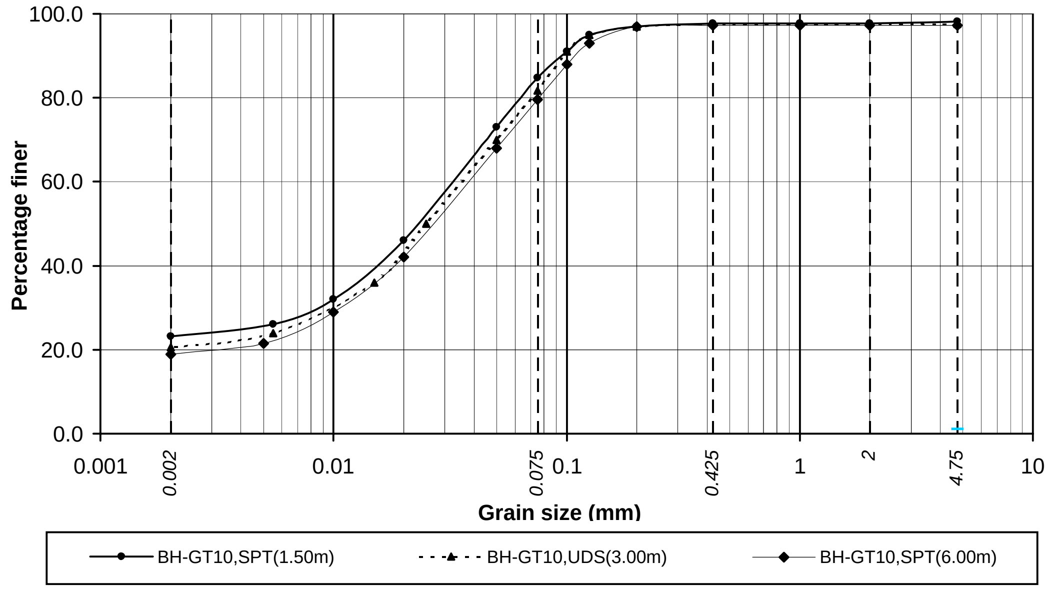
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT09,SPT(10.50m)	11.6		88.10	0.3
BH-GT09,SPT(15.50m)	9.6		90.40	0.0
BH-GT09,SPT(20.50m)	7.7		91.70	0.6

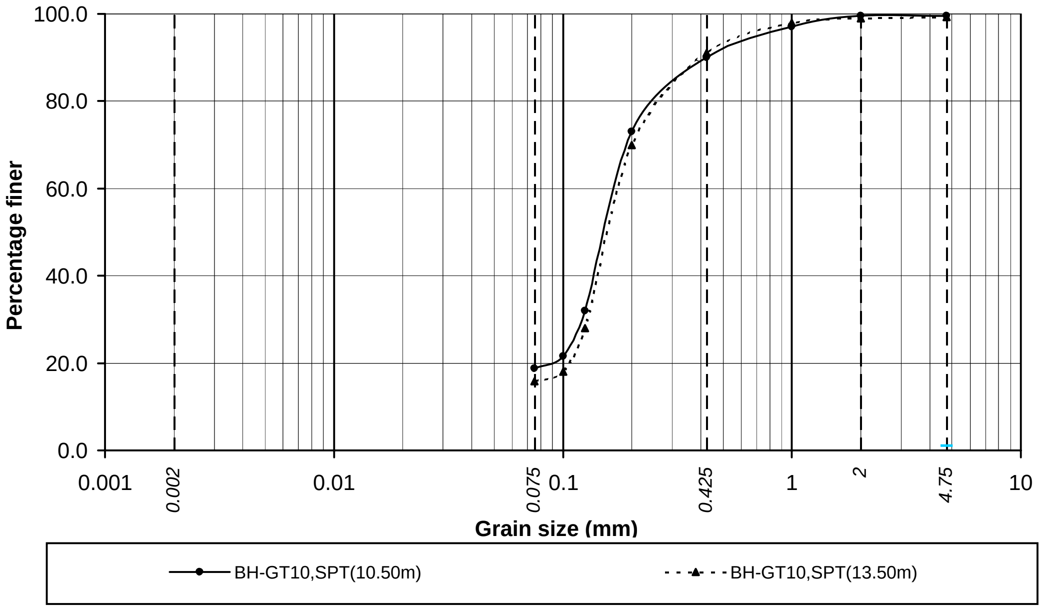
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT10,SPT(1.50m)	23.2	61.6	13.30	1.9
BH-GT10,UDS(3.00m)	20.6	61.1	15.80	2.5
BH-GT10,SPT(6.00m)	18.9	60.7	17.70	2.7

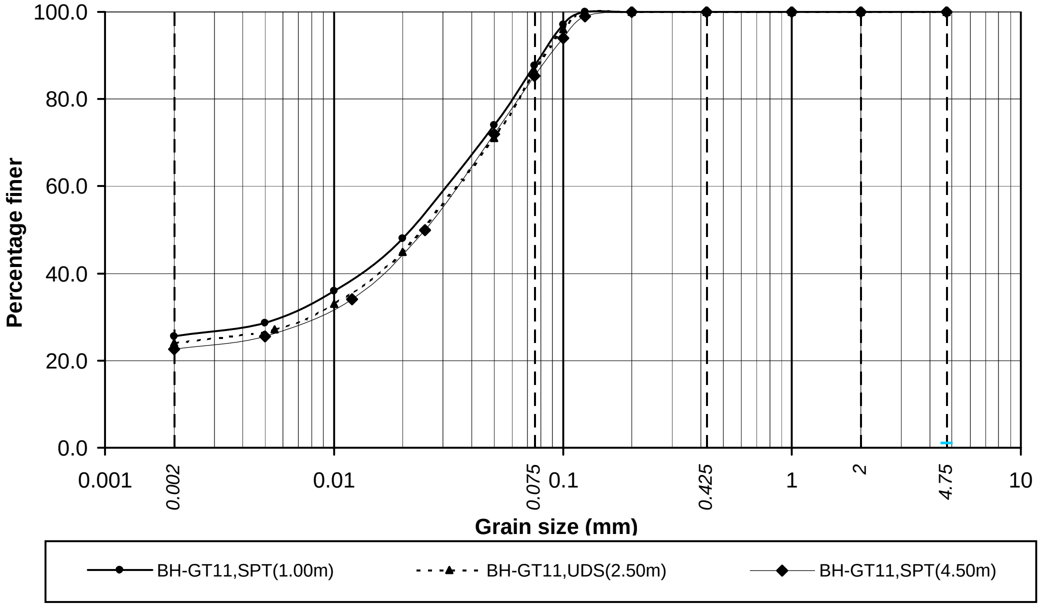
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



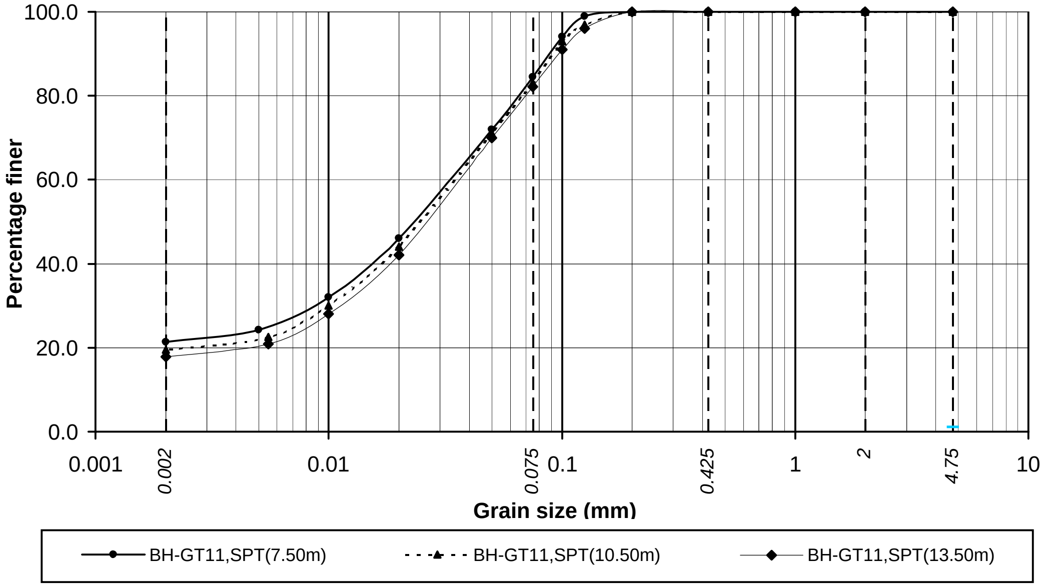
Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT10,SPT(10.50m)	18.7		80.90	0.4
BH-GT10,SPT(13.50m)	15.8		83.40	0.8

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT11,SPT(1.00m)	25.6	62.1	12.30	0.0
BH-GT11,UDS(2.50m)	24.1	62.4	13.50	0.0
BH-GT11,SPT(4.50m)	22.6	62.7	14.70	0.0

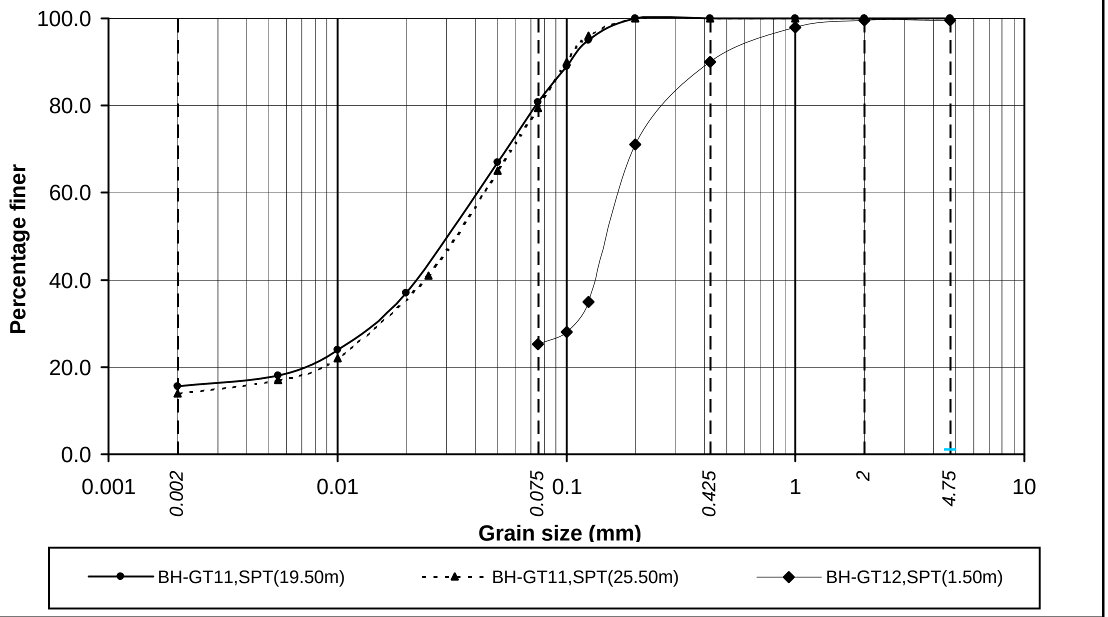
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT11,SPT(7.50m)	21.3	63.2	15.50	0.0
BH-GT11,SPT(10.50m)	19.5	63.6	16.90	0.0
BH-GT11,SPT(13.50m)	17.9	64.3	17.80	0.0

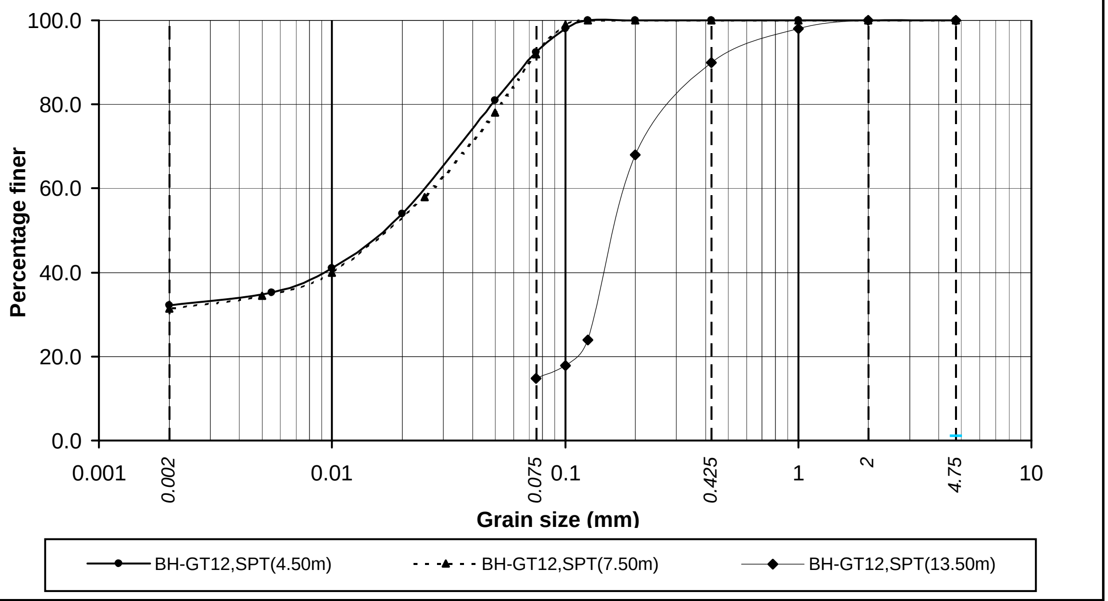
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT11,SPT(19.50m)	15.5	65.2	19.30	0.0
BH-GT11,SPT(25.50m)	14.0	65.5	20.50	0.0
BH-GT12,SPT(1.50m)	25.3		74.70	0.0

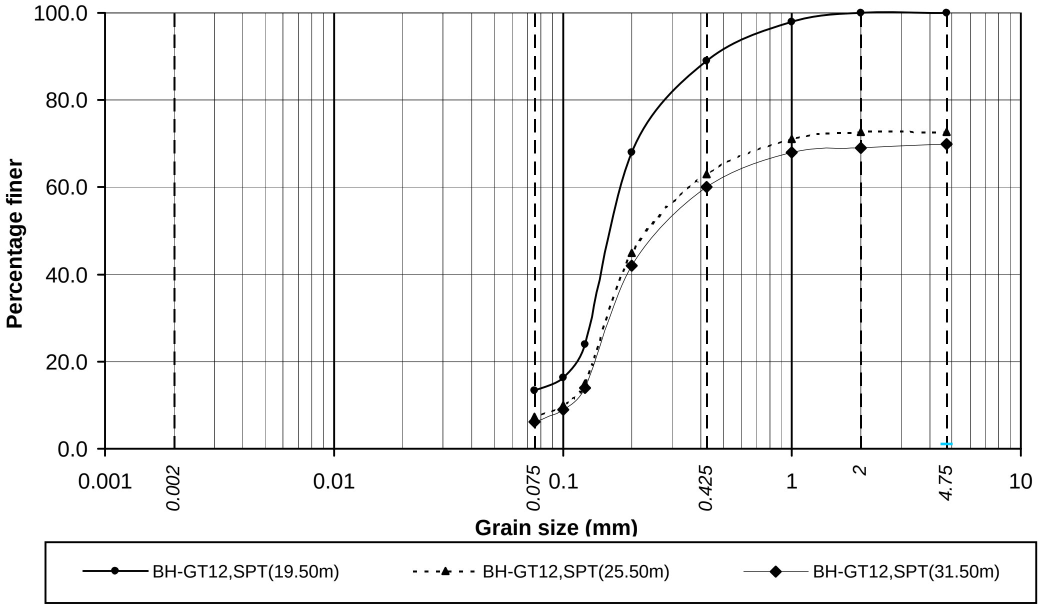
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT12,SPT(4.50m)	32.2	60.2	7.60	0.0
BH-GT12,SPT(7.50m)	31.4	60.5	8.10	0.0
BH-GT12,SPT(13.50m)	14.8		85.20	0.0

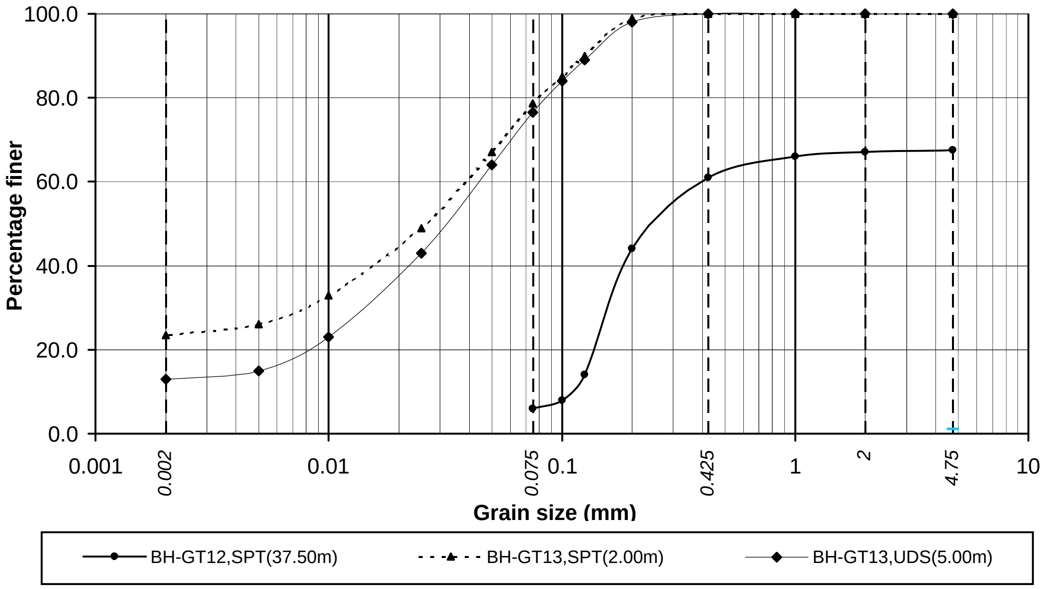
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT12,SPT(19.50m)	13.3		86.70	0.0
BH-GT12,SPT(25.50m)	7.4		65.30	27.3
BH-GT12,SPT(31.50m)	6.1		63.80	30.1

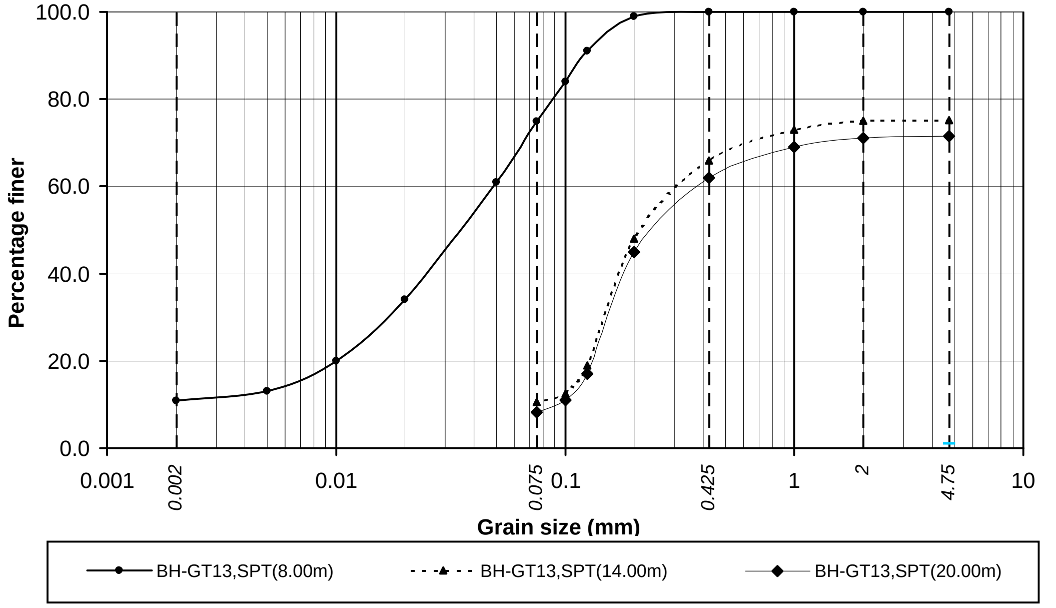
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT12,SPT(37.50m)	5.9		61.70	32.4
BH-GT13,SPT(2.00m)	15.5	63.2	21.30	0.0
BH-GT13,UDS(5.00m)	12.9	63.6	23.50	0.0

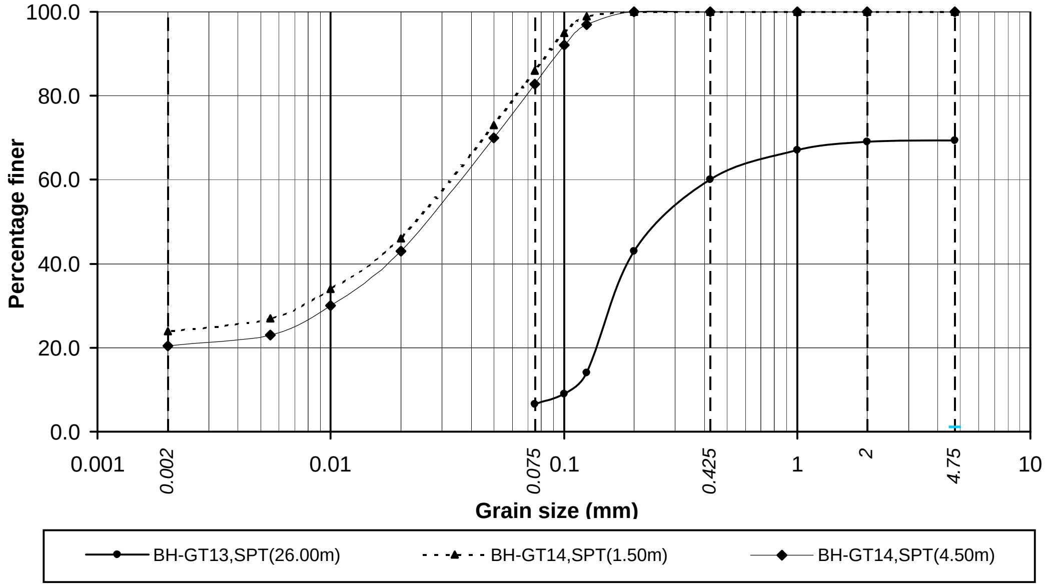
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT13,SPT(8.00m)	10.9	64.0	25.10	0.0
BH-GT13,SPT(14.00m)	10.5		64.70	24.8
BH-GT13,SPT(20.00m)	8.2		63.30	28.5

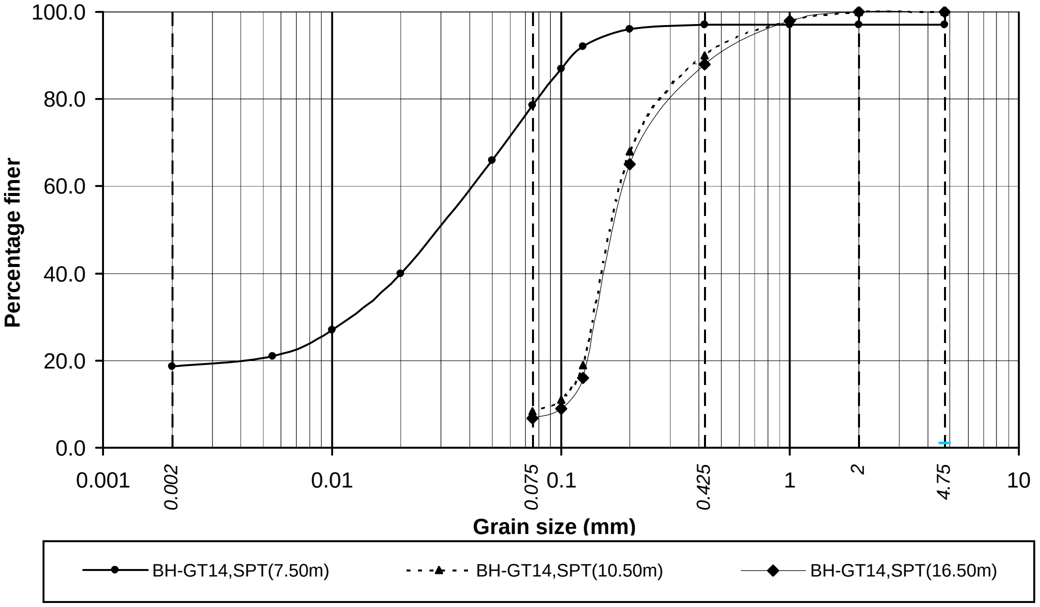
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT13,SPT(26.00m)	6.6		62.80	30.6
BH-GT14,SPT(1.50m)	24.0	60.4	14.10	1.5
BH-GT14,SPT(4.50m)	20.5	60.2	17.20	2.1

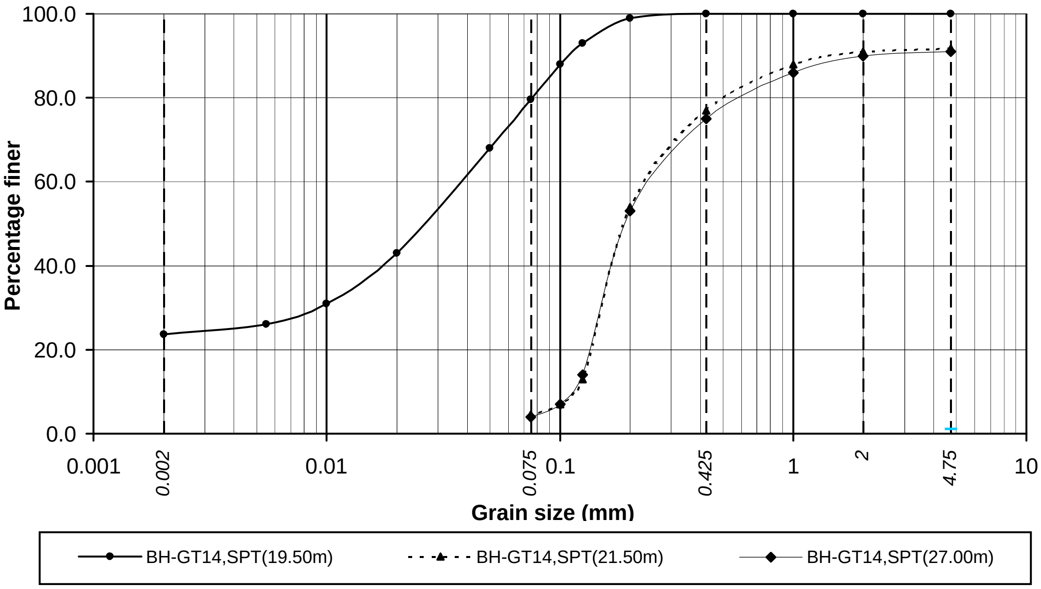
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT14,SPT(7.50m)	18.7	59.8	18.50	3.0
BH-GT14,SPT(10.50m)	8.4		91.60	0.0
BH-GT14,SPT(16.50m)	6.7		93.30	0.0

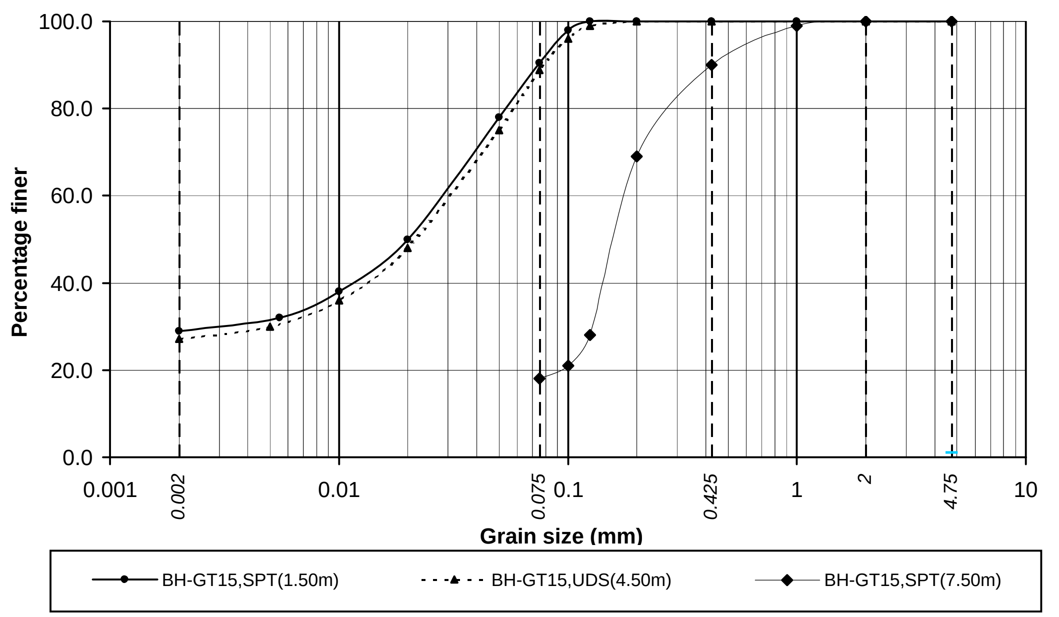
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT14,SPT(19.50m)	23.6	56.0	20.40	0.0
BH-GT14,SPT(21.50m)	4.6		87.20	8.2
BH-GT14,SPT(27.00m)	4.0		87.00	9.0

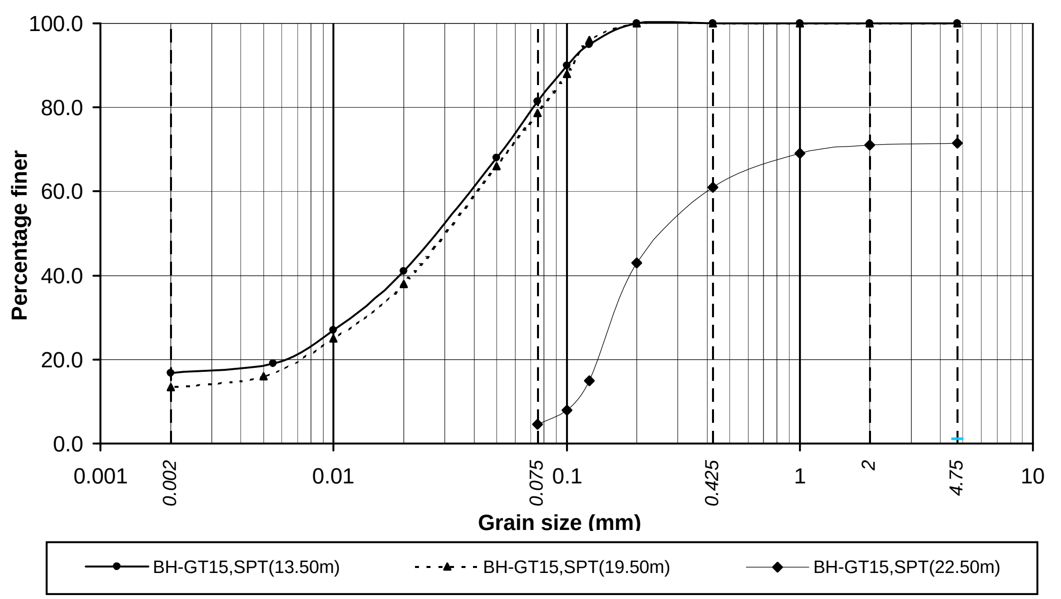
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT15,SPT(1.50m)	29.0	61.4	9.60	0.0
BH-GT15,UDS(4.50m)	27.1	61.7	11.20	0.0
BH-GT15,SPT(7.50m)	18.1		81.90	0.0

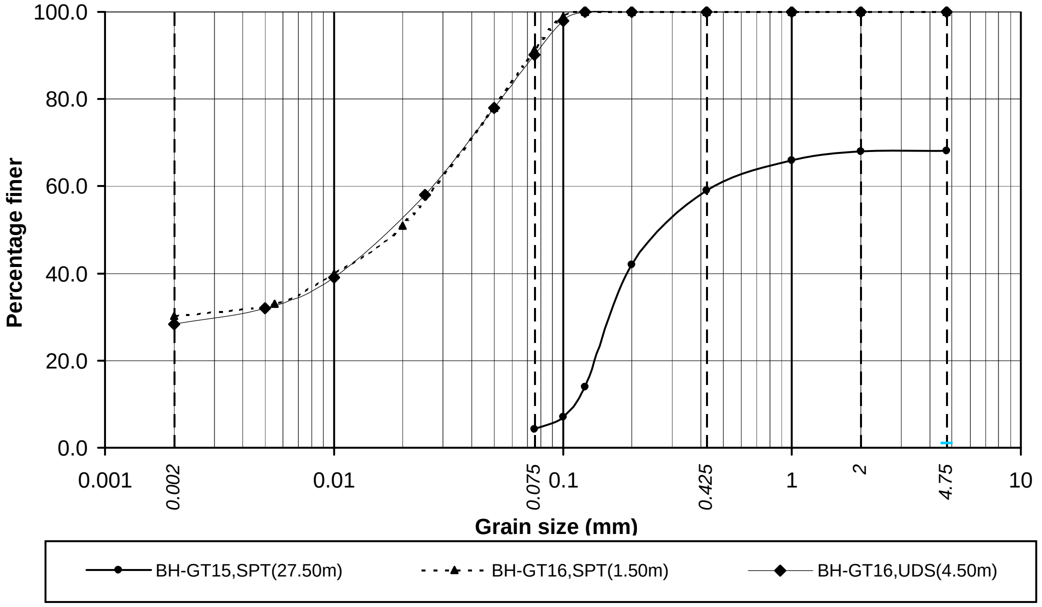
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT15,SPT(13.50m)	16.7	64.7	18.60	0.0
BH-GT15,SPT(19.50m)	13.4	65.3	21.30	0.0
BH-GT15,SPT(22.50m)	4.6		66.90	28.5

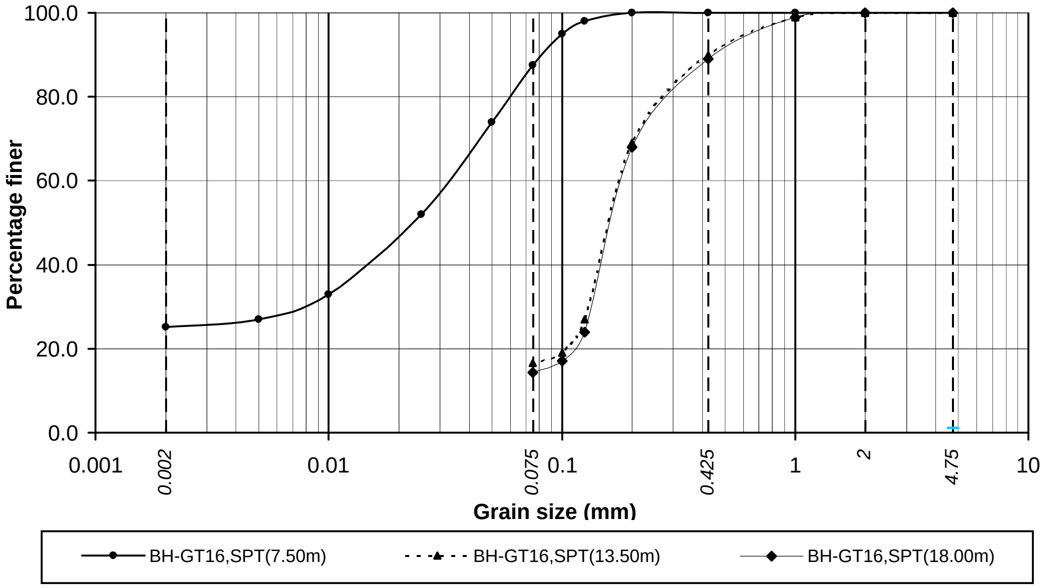
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT15,SPT(27.50m)	4.2		64.00	31.8
BH-GT16,SPT(1.50m)	30.2	61.1	8.70	0.0
BH-GT16,UDS(4.50m)	28.4	61.8	9.80	0.0

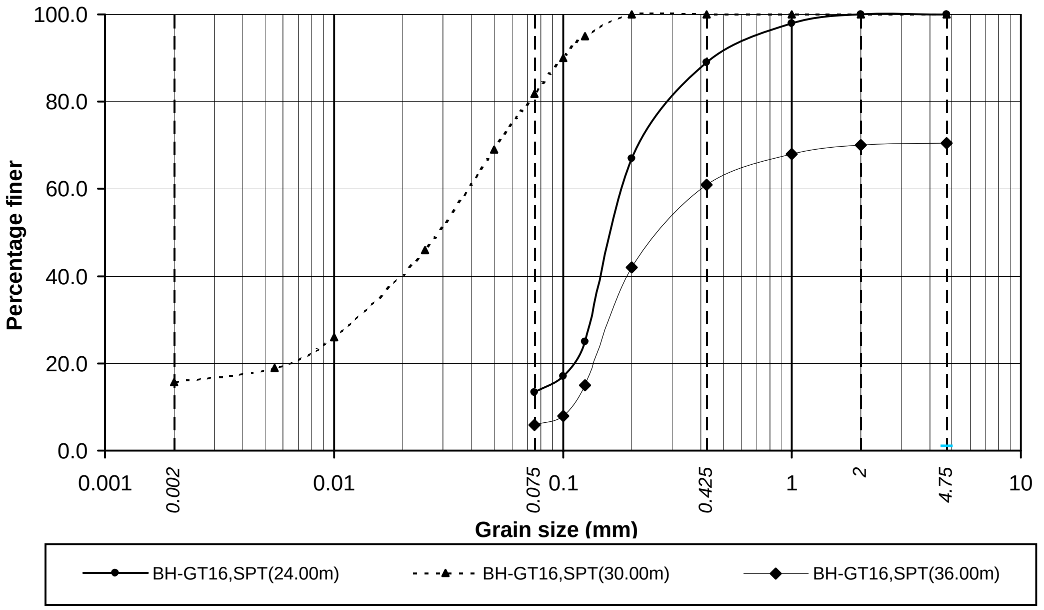
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT16,SPT(7.50m)	25.1	62.4	12.50	0.0
BH-GT16,SPT(13.50m)	16.6		83.40	0.0
BH-GT16,SPT(18.00m)	14.4		85.60	0.0

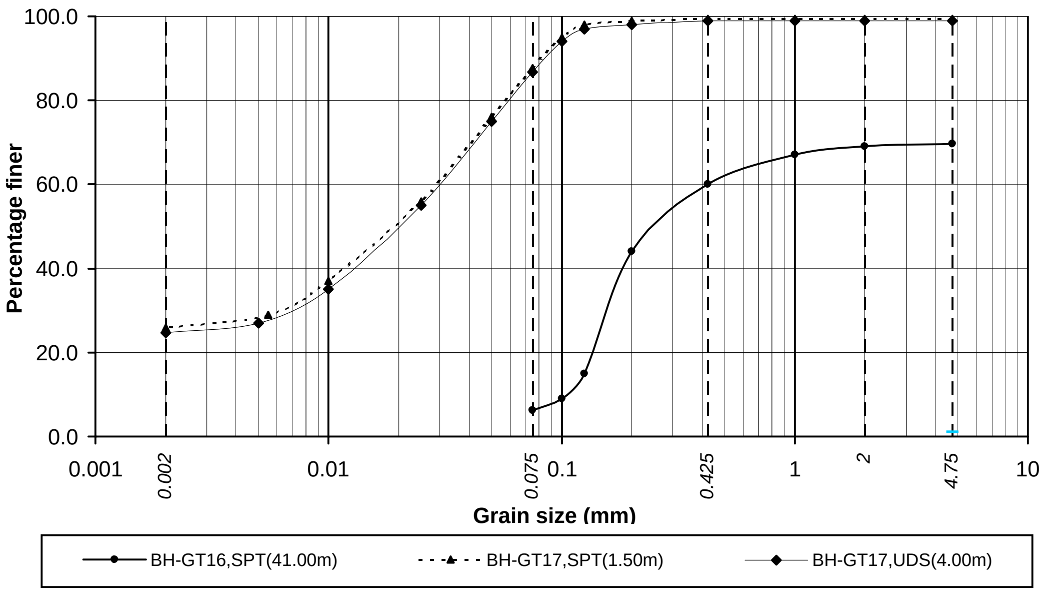
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT16,SPT(24.00m)	13.3		86.70	0.0
BH-GT16,SPT(30.00m)	15.7	66.1	18.20	0.0
BH-GT16,SPT(36.00m)	5.9		64.60	29.5

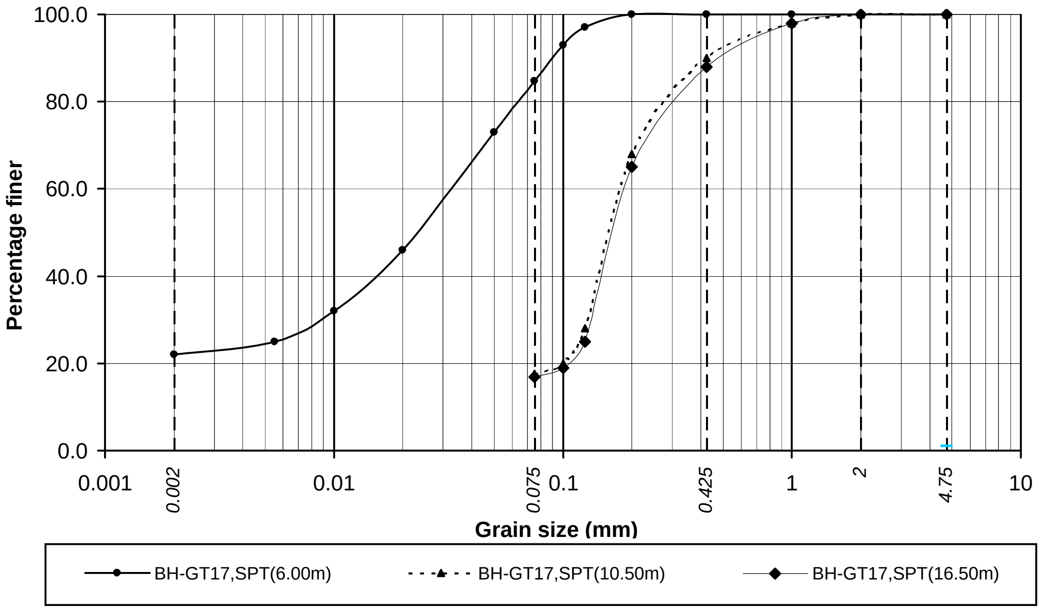
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT16,SPT(41.00m)	6.3		63.30	30.4
BH-GT17,SPT(1.50m)	25.9	61.8	11.70	0.6
BH-GT17,UDS(4.00m)	24.7	62.1	12.20	1.0

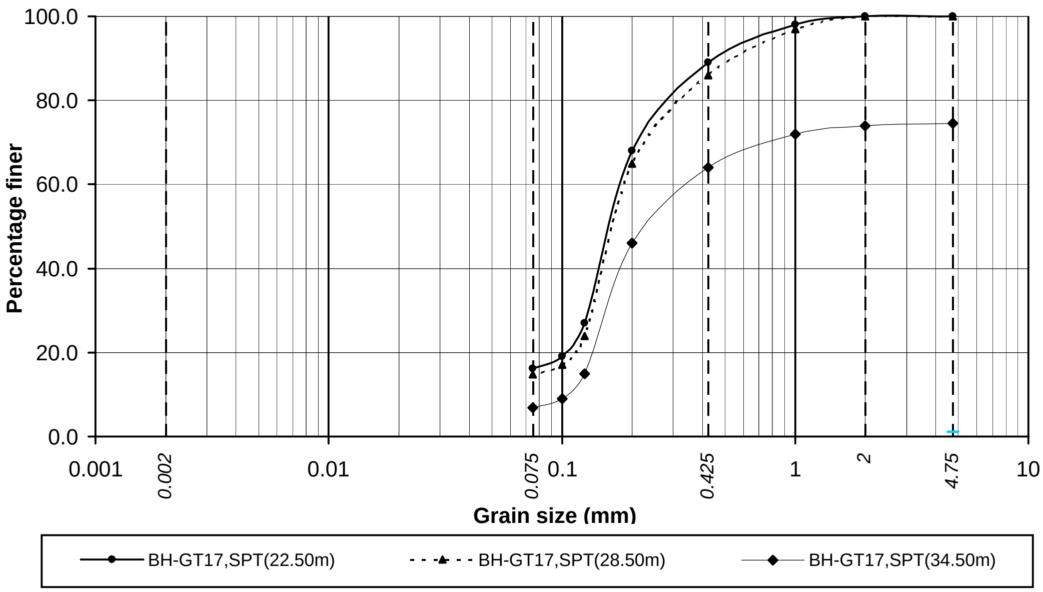
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT17,SPT(6.00m)	22.0	62.7	15.30	0.0
BH-GT17,SPT(10.50m)	17.6		82.40	0.0
BH-GT17,SPT(16.50m)	16.9		83.10	0.0

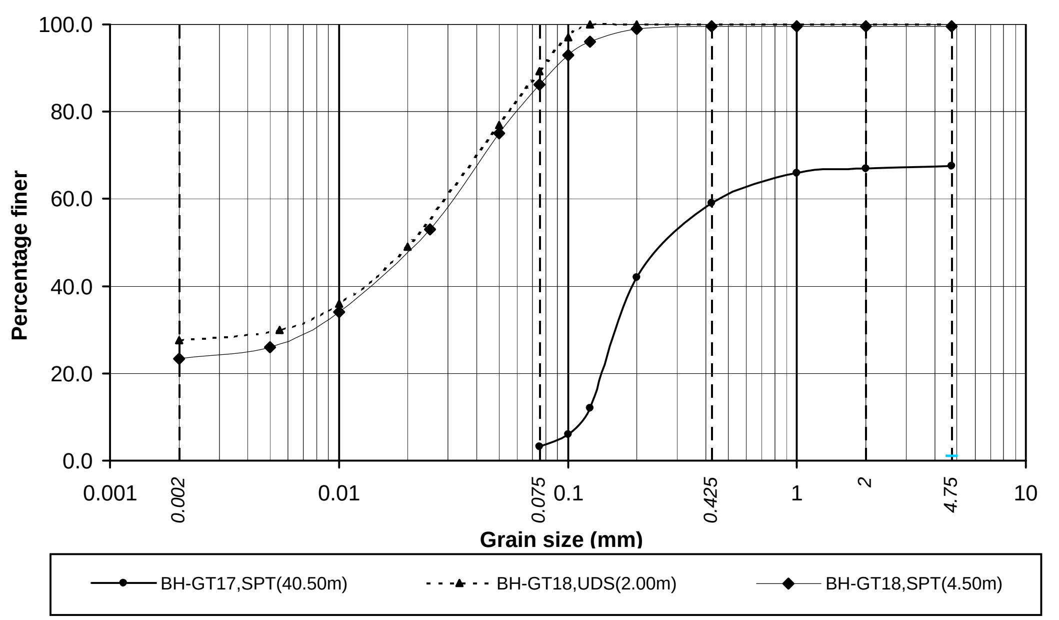
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT17,SPT(22.50m)	16.1		83.90	0.0
BH-GT17,SPT(28.50m)	14.8		85.20	0.0
BH-GT17,SPT(34.50m)	6.8		67.80	25.4

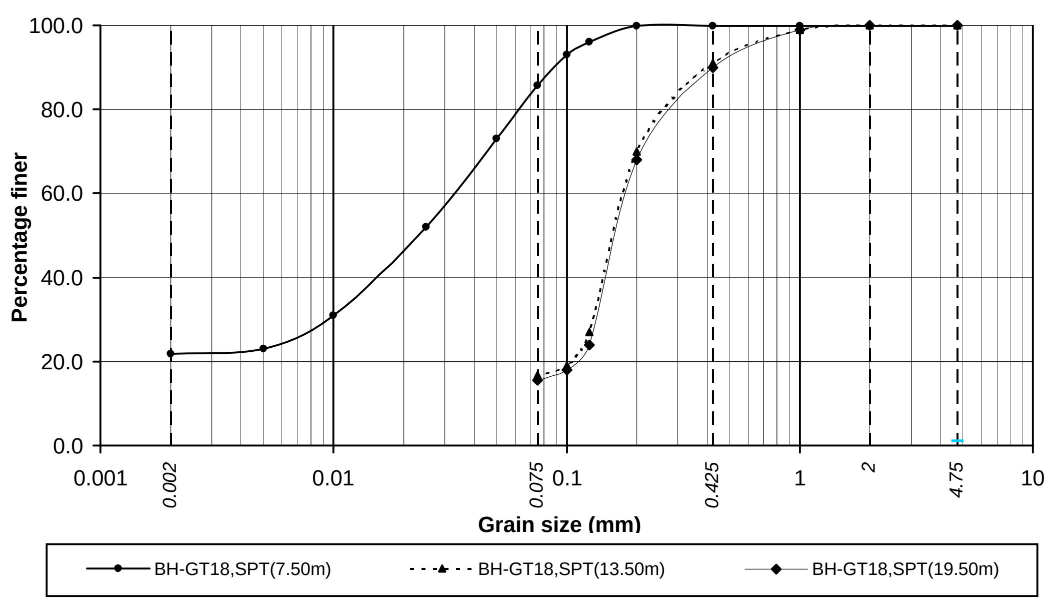
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT17,SPT(40.50m)	3.3		64.20	32.5
BH-GT18,UDS(2.00m)	27.6	61.7	10.70	0.0
BH-GT18,SPT(4.50m)	23.3	62.5	13.80	0.4

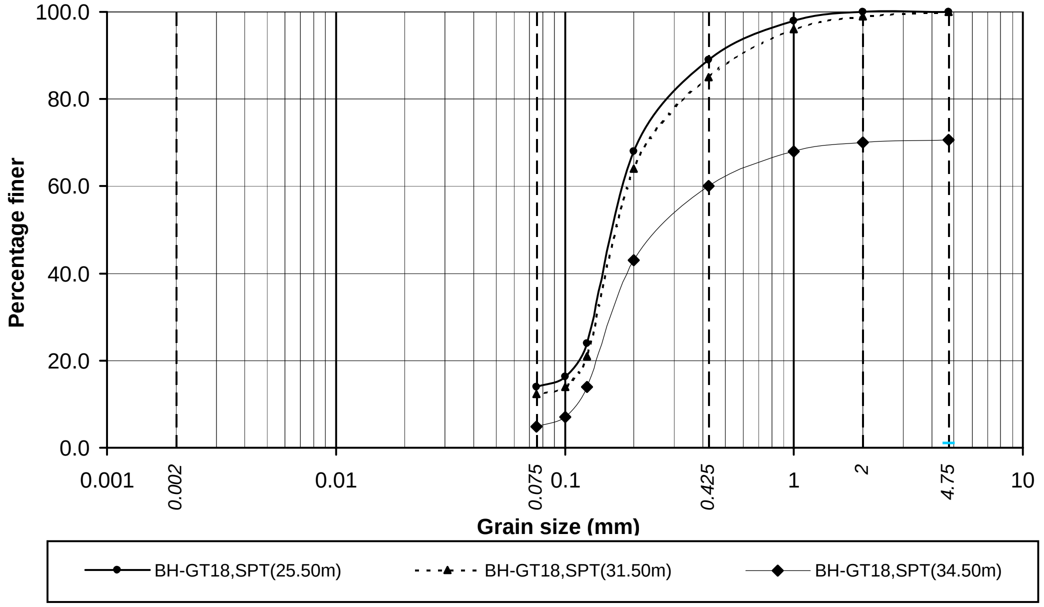
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT18,SPT(7.50m)	21.8	63.1	14.40	0.7
BH-GT18,SPT(13.50m)	16.7		83.30	0.0
BH-GT18,SPT(19.50m)	15.6		84.20	0.2

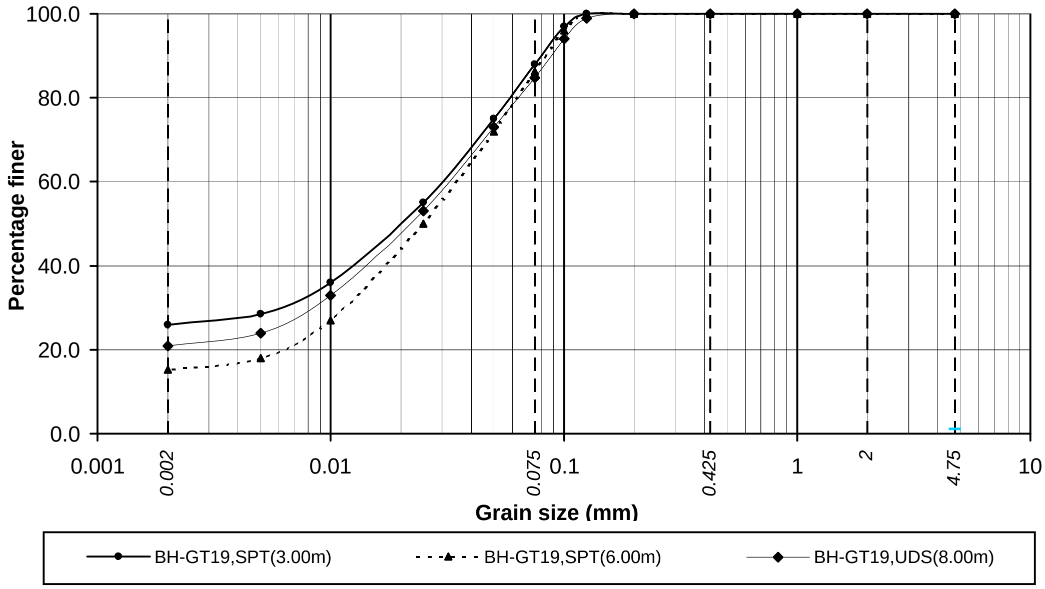
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT18,SPT(25.50m)	13.9		86.10	0.0
BH-GT18,SPT(31.50m)	12.4		87.60	0.0
BH-GT18,SPT(34.50m)	4.9		65.70	29.4

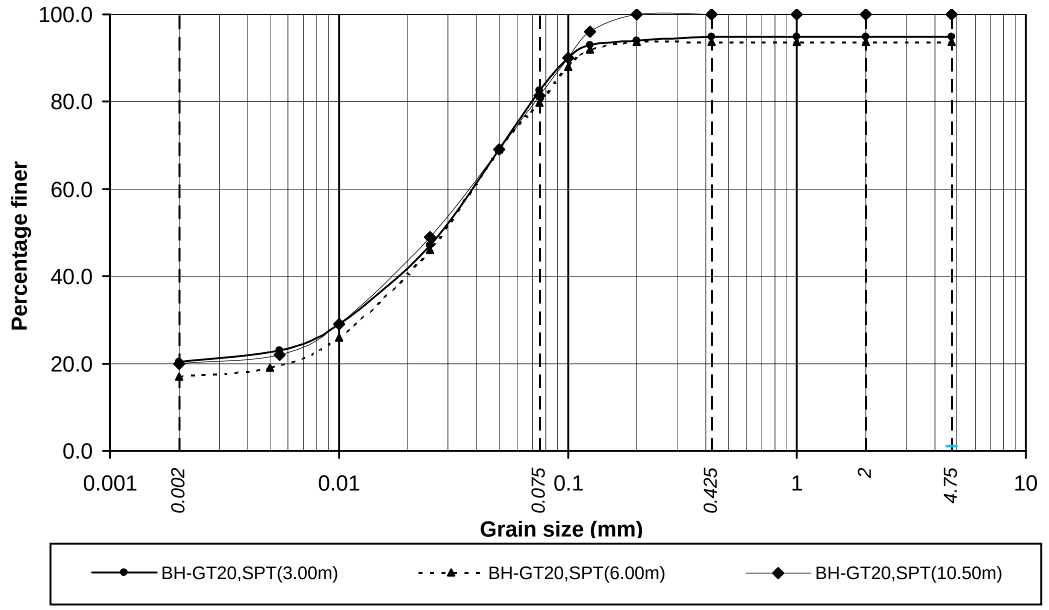
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT19,SPT(3.00m)	25.9	62.0	12.10	0.0
BH-GT19,SPT(6.00m)	23.7	62.6	13.70	0.0
BH-GT19,UDS(8.00m)	20.9	63.8	15.30	0.0

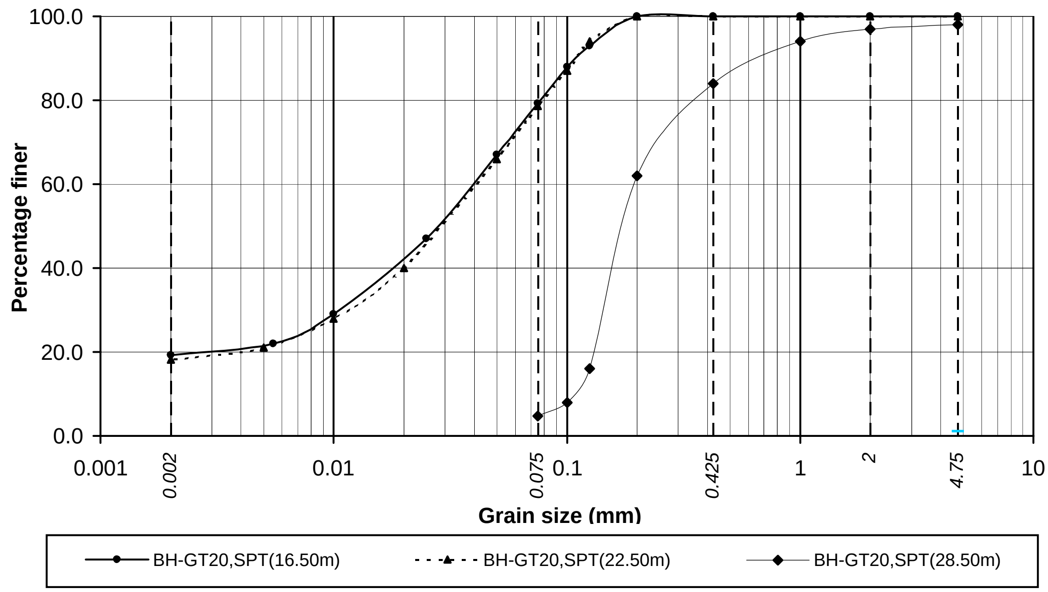
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT20,SPT(3.00m)	62.2		12.30	5.1
BH-GT20,SPT(6.00m)	17.0	62.7	14.00	6.3
BH-GT20,SPT(10.50m)	61.5		18.60	0.0

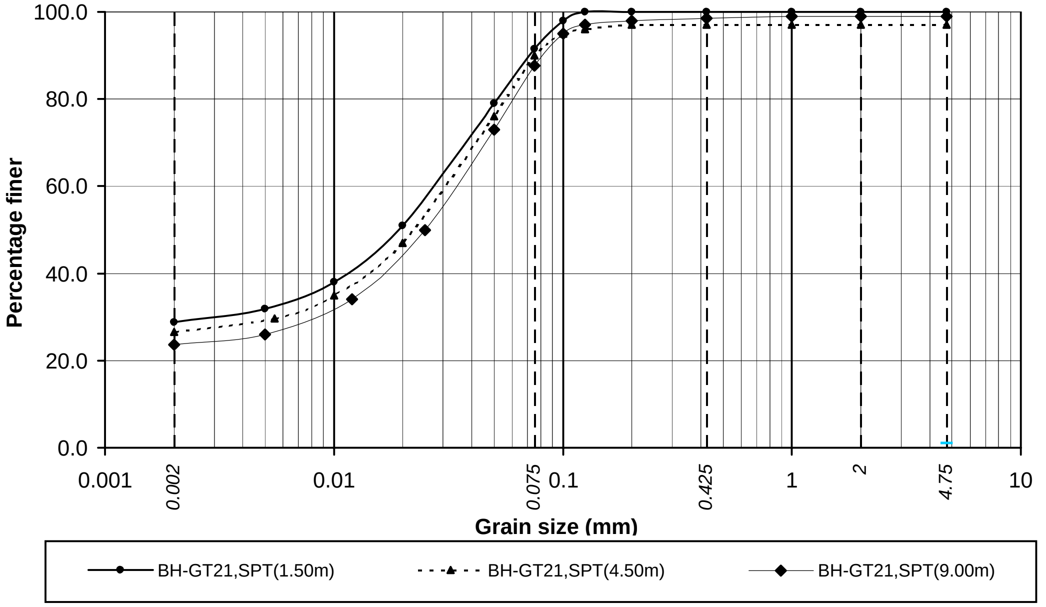
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT20,SPT(16.50m)	19.3	60.0	20.70	0.0
BH-GT20,SPT(22.50m)	18.2	60.5	21.30	0.0
BH-GT20,SPT(28.50m)	4.8		93.20	2.0

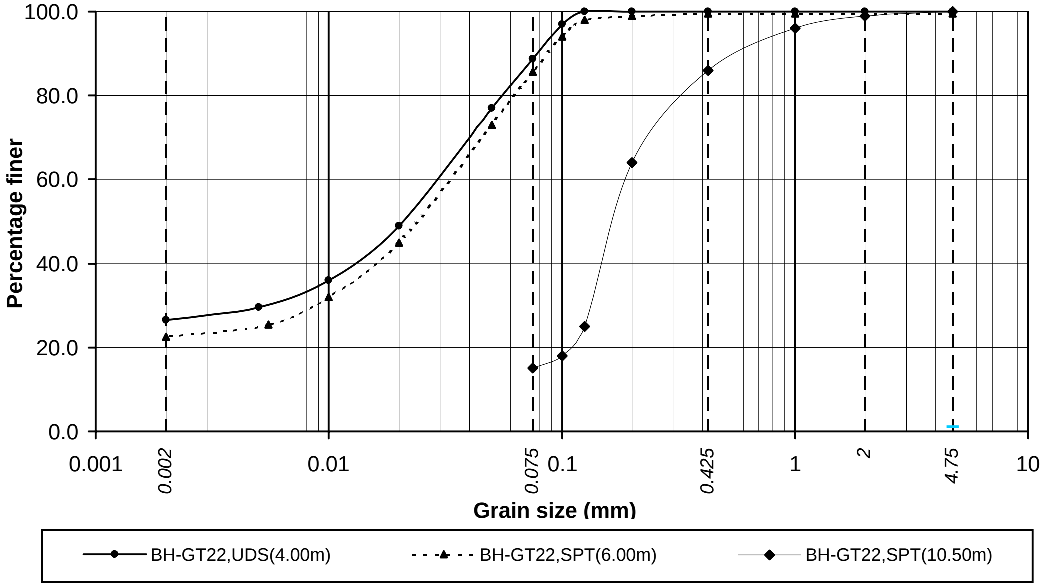
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT21,SPT(1.50m)	28.8	62.7	8.50	0.0
BH-GT21,SPT(4.50m)	26.6	63.4	9.40	0.6
BH-GT21,SPT(9.00m)	23.6	64.1	11.20	1.1

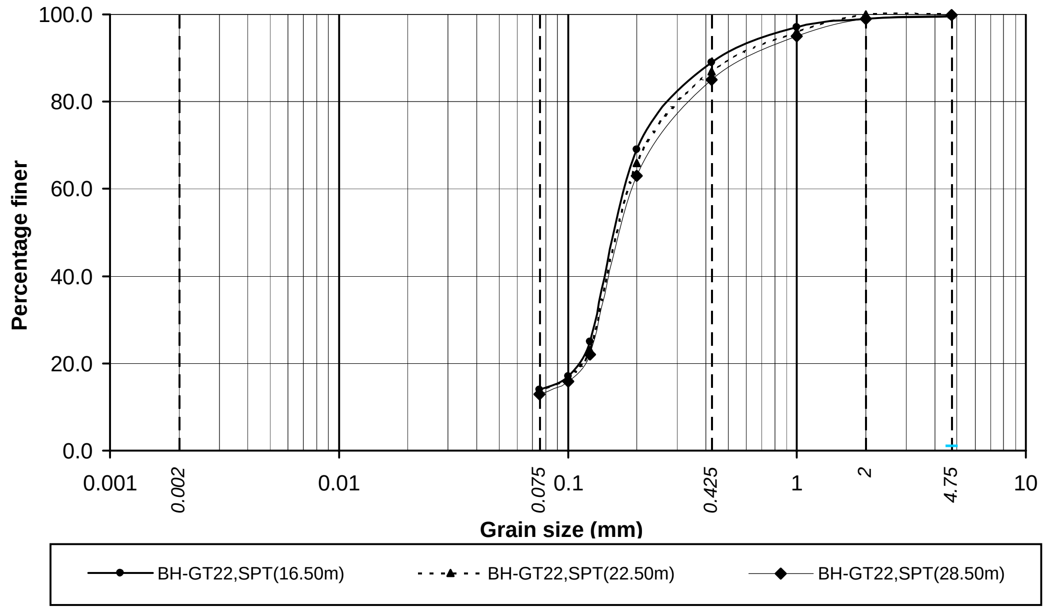
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT22,UDS(4.00m)	26.5	62.2	11.30	0.0
BH-GT22,SPT(6.00m)	22.5	63.1	14.00	0.4
BH-GT22,SPT(10.50m)	15.1		84.90	0.0

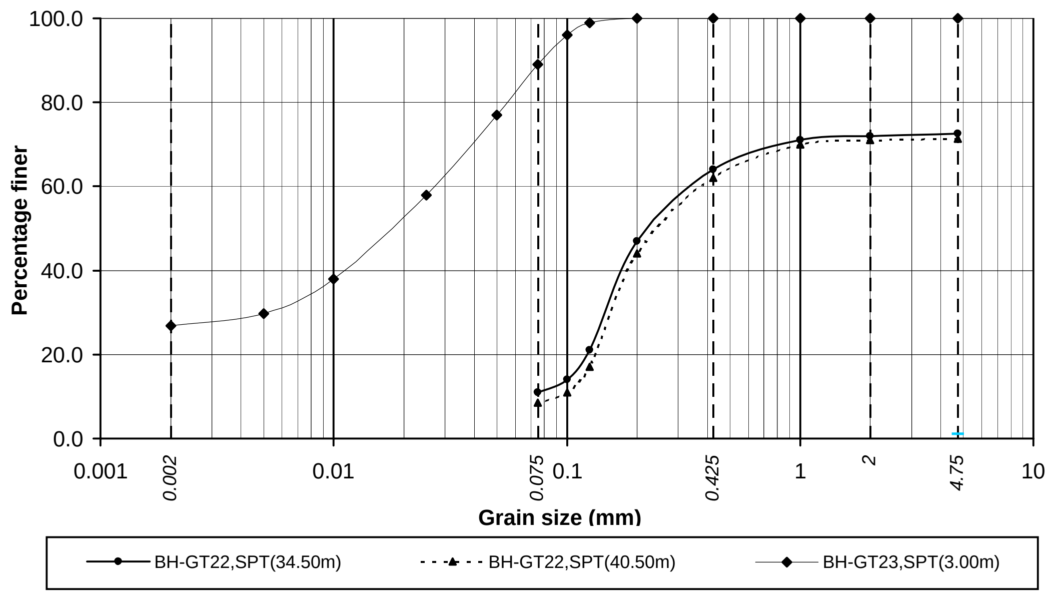
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT22,SPT(16.50m)	14.0		85.50	0.5
BH-GT22,SPT(22.50m)	13.7		86.30	0.0
BH-GT22,SPT(28.50m)	12.9		87.00	0.1

GRAIN SIZE DISTRIBUTION CURVES

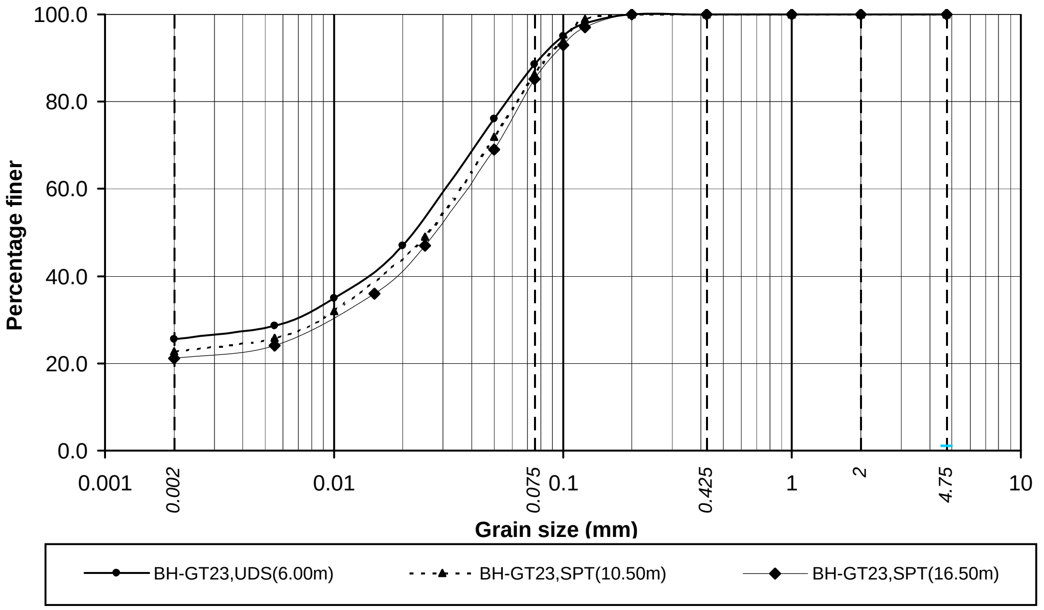


Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT22,SPT(34.50m)	11.0		61.60	27.4
BH-GT22,SPT(40.50m)	8.5		62.80	28.7
BH-GT23,SPT(3.00m)	26.8	62.3	10.90	0.0

*Silt & Clay

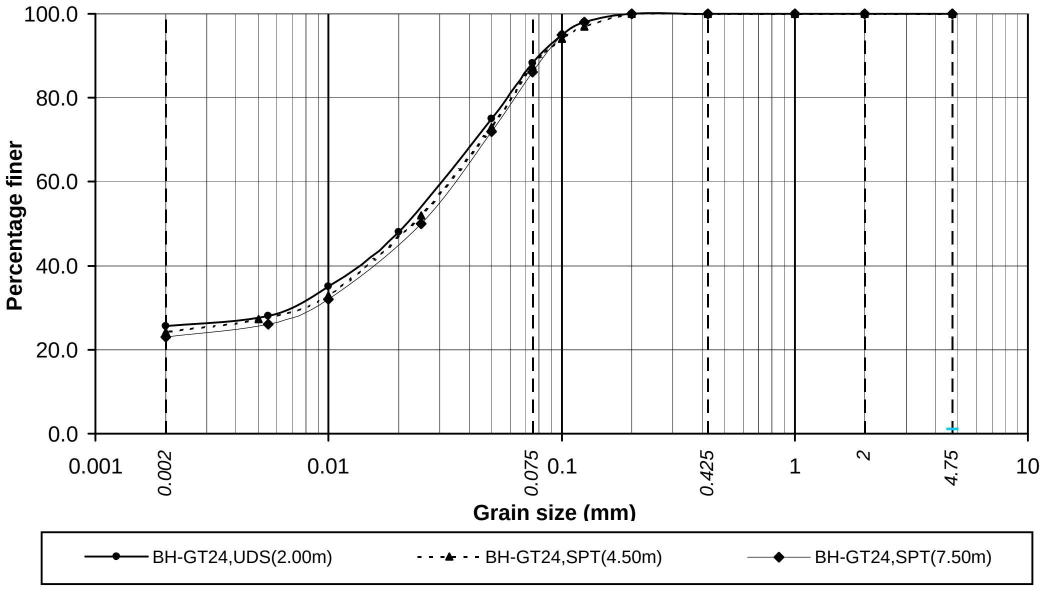
Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT23,UDS(6.00m)	25.6	62.9	11.50	0.0
BH-GT23,SPT(10.50m)	22.8	63.6	13.60	0.0
BH-GT23,SPT(16.50m)	21.1	64.1	14.80	0.0

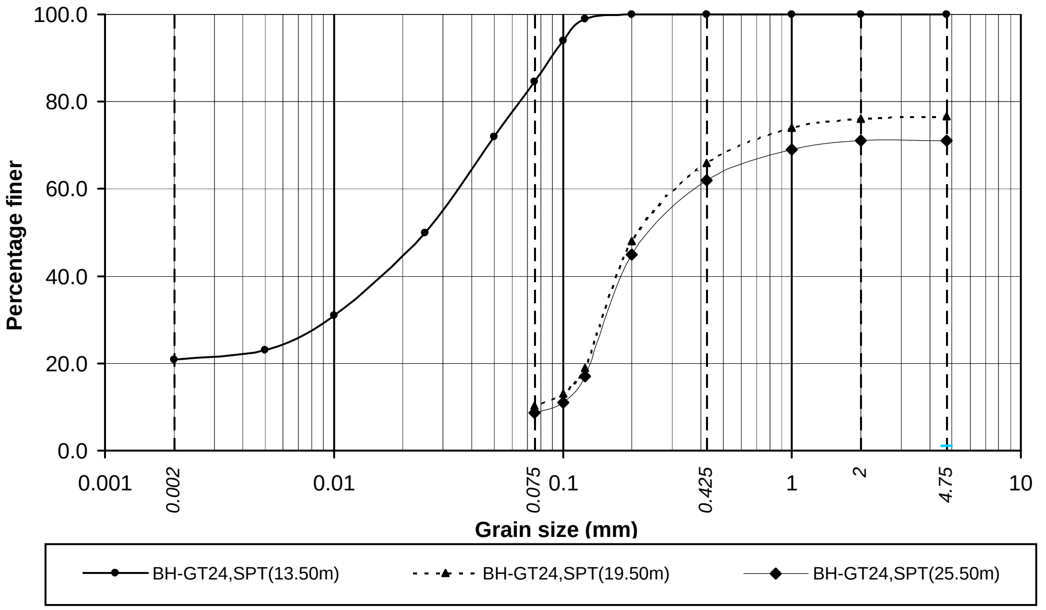
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT24,UDS(2.00m)	25.6	62.7	11.70	0.0
BH-GT24,SPT(4.50m)	24.3	63.2	12.50	0.0
BH-GT24,SPT(7.50m)	23.0	63.1	13.90	0.0

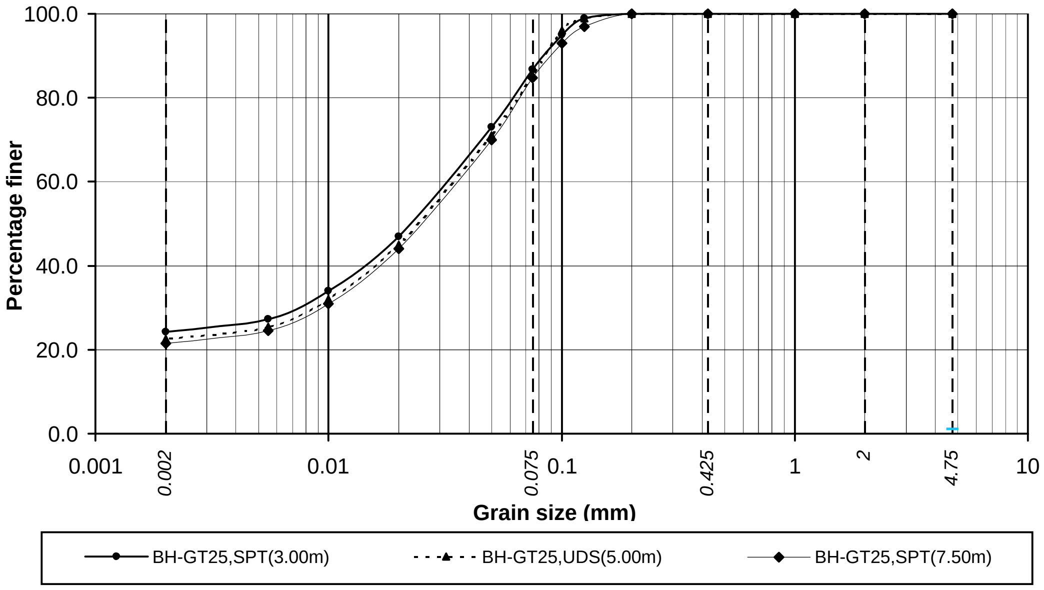
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT24,SPT(13.50m)	20.9	63.7	15.40	0.0
BH-GT24,SPT(19.50m)	10.3		66.30	23.4
BH-GT24,SPT(25.50m)	8.6		62.50	28.9

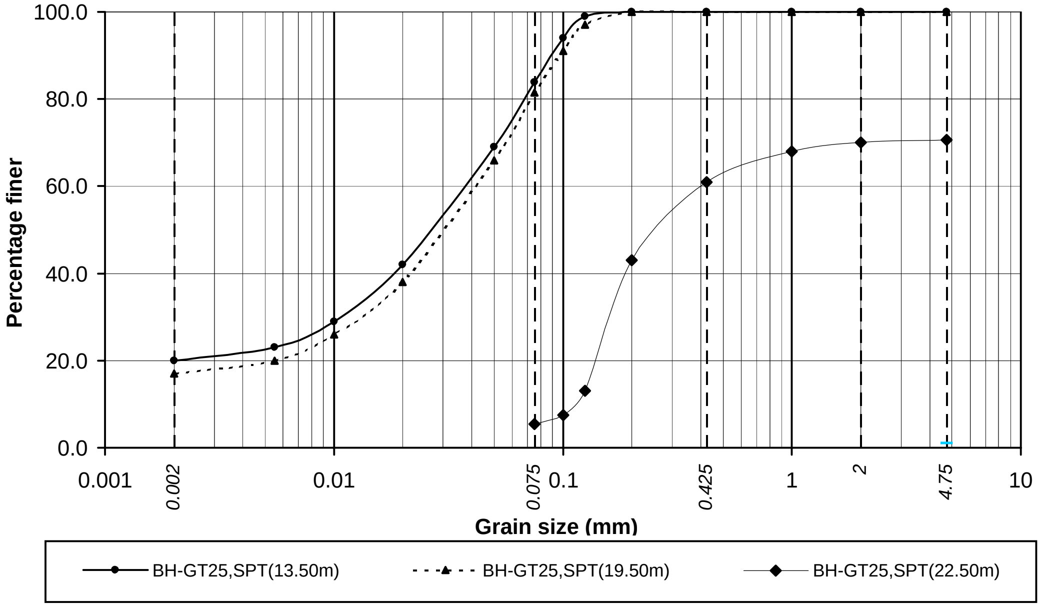
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT25,SPT(3.00m)	24.3	62.4	13.30	0.0
BH-GT25,UDS(5.00m)	22.5	62.9	14.60	0.0
BH-GT25,SPT(7.50m)	21.5	63.3	15.20	0.0

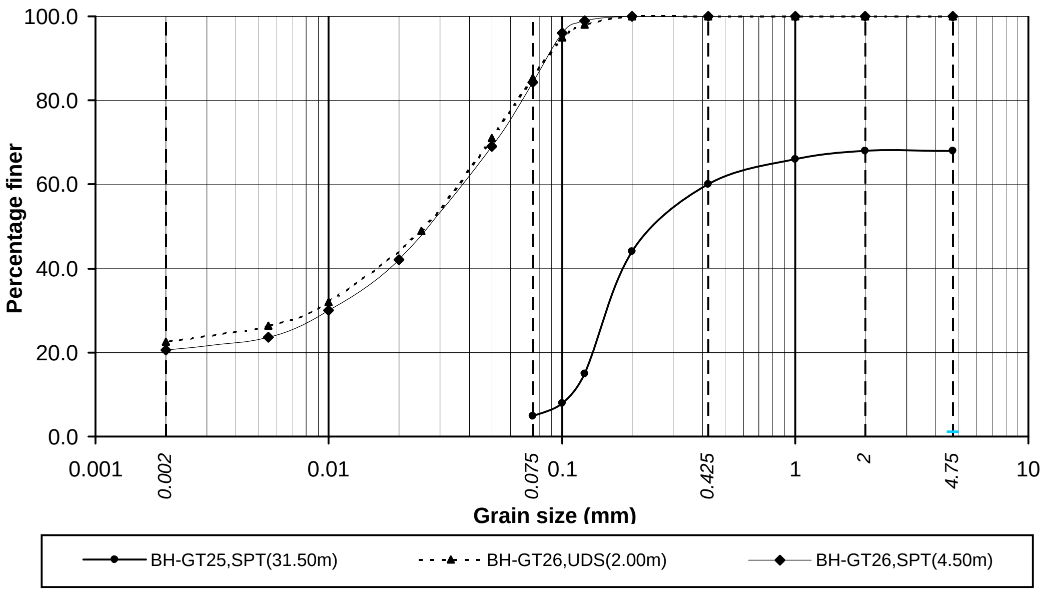
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT25,SPT(13.50m)	20.0	63.9	16.10	0.0
BH-GT25,SPT(19.50m)	17.0	64.5	18.50	0.0
BH-GT25,SPT(22.50m)	5.5		65.20	29.3

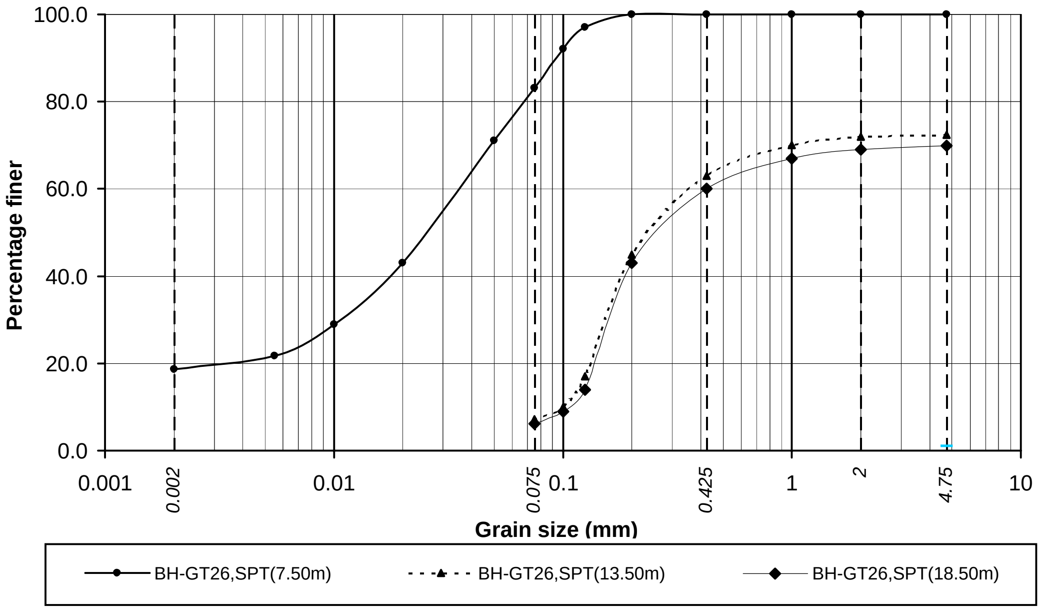
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT25,SPT(31.50m)	4.9		63.10	32.0
BH-GT26,UDS(2.00m)	22.6	62.8	14.60	0.0
BH-GT26,SPT(4.50m)	20.6	63.7	15.70	0.0

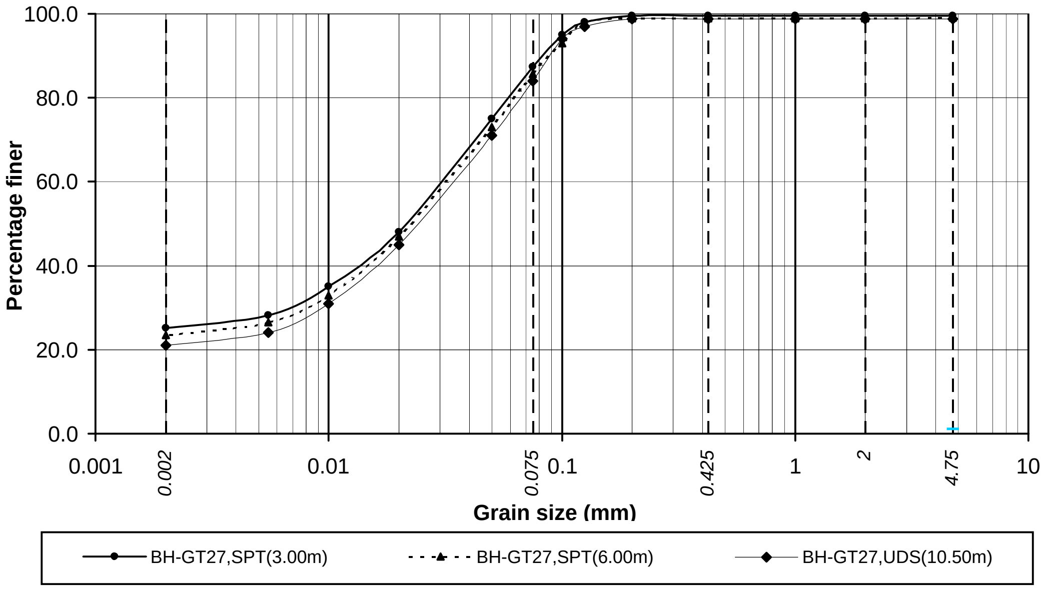
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT26,SPT(7.50m)	18.7	64.4	16.90	0.0
BH-GT26,SPT(13.50m)	0.0	7.2	65.20	27.6
BH-GT26,SPT(18.50m)	0.0	6.2	63.70	30.1

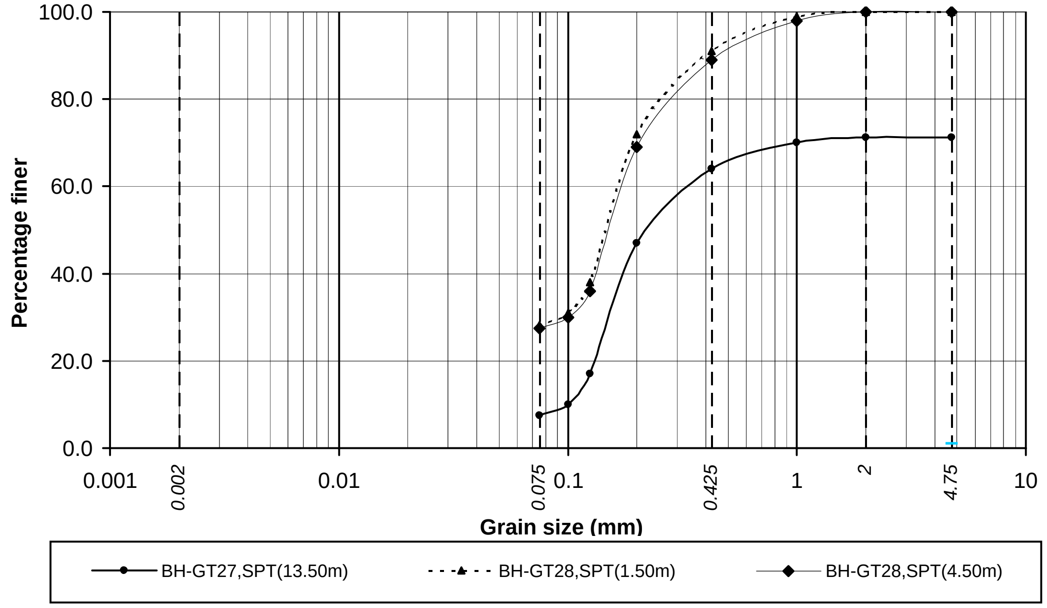
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT27,SPT(3.00m)	25.2	61.6	12.70	0.5
BH-GT27,SPT(6.00m)	23.5	62.1	13.50	0.9
BH-GT27,UDS(10.50m)	21.1	62.9	14.80	1.2

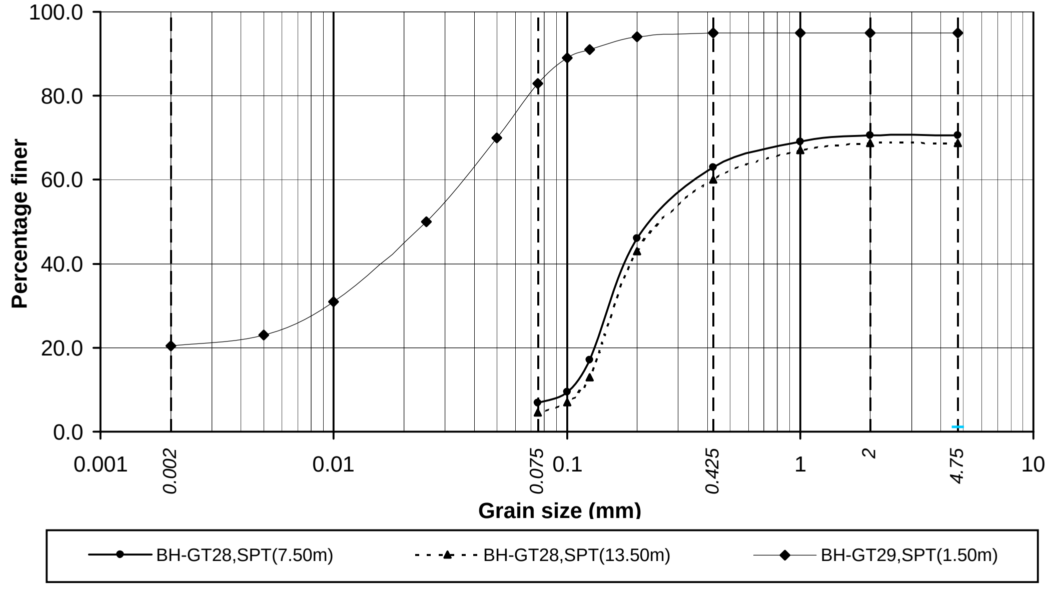
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT27,SPT(13.50m)	7.5		63.70	28.8
BH-GT28,SPT(1.50m)	28.2		71.80	0.0
BH-GT28,SPT(4.50m)	27.5		72.50	0.0

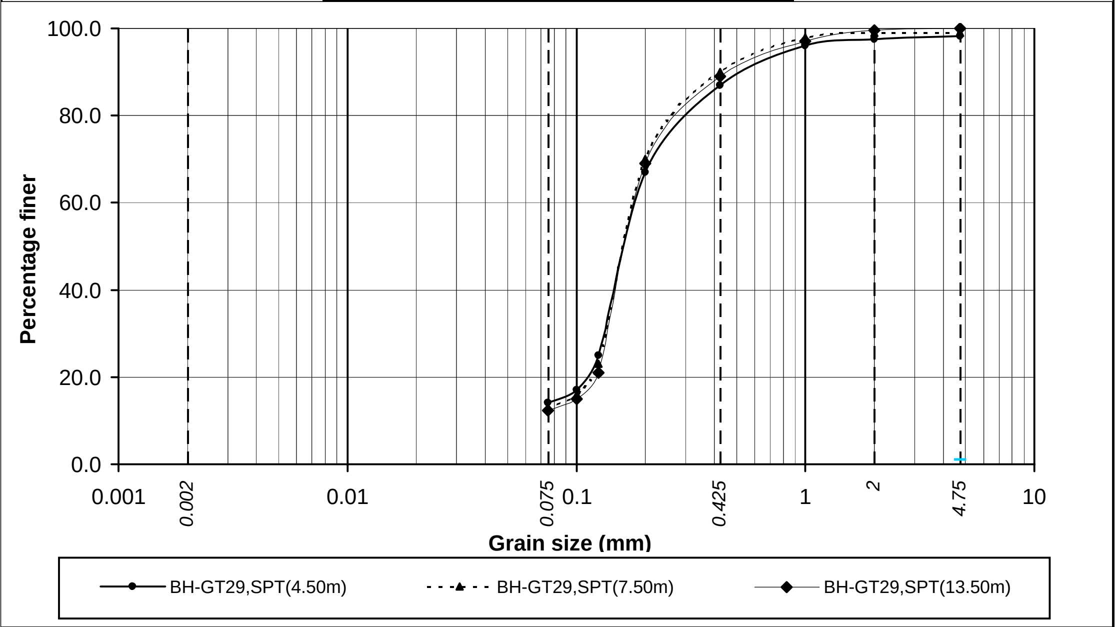
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT28,SPT(7.50m)	6.9		63.70	29.4
BH-GT28,SPT(13.50m)	4.5		64.20	31.3
BH-GT29,SPT(1.50m)	20.5	62.4	12.10	5.0

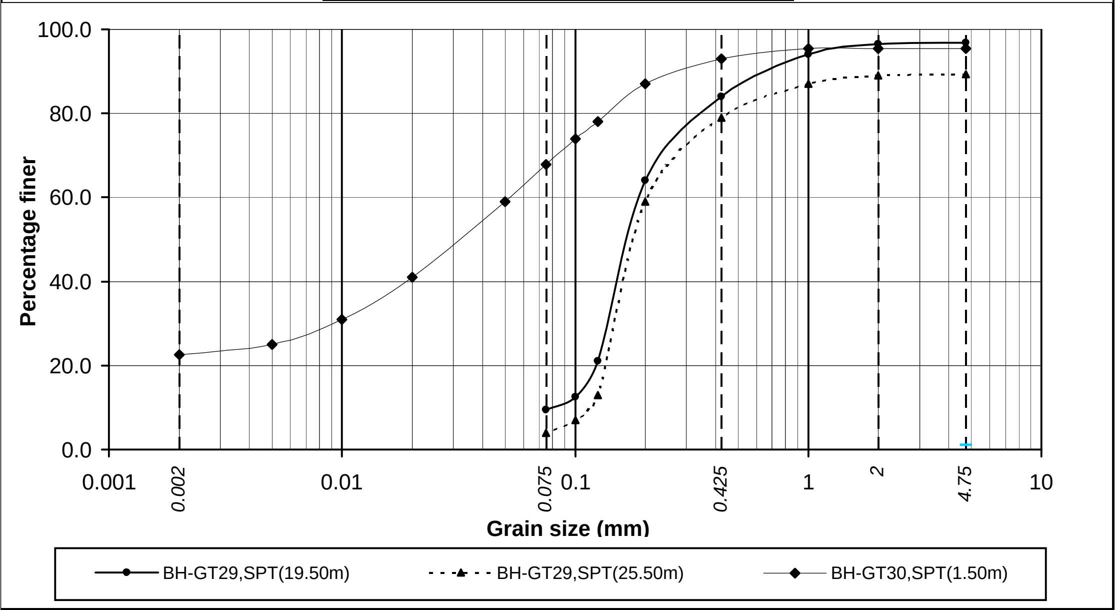
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT29,SPT(4.50m)	14.1		84.20	1.7
BH-GT29,SPT(7.50m)	13.1		85.90	1.0
BH-GT29,SPT(13.50m)	12.3		87.70	0.0

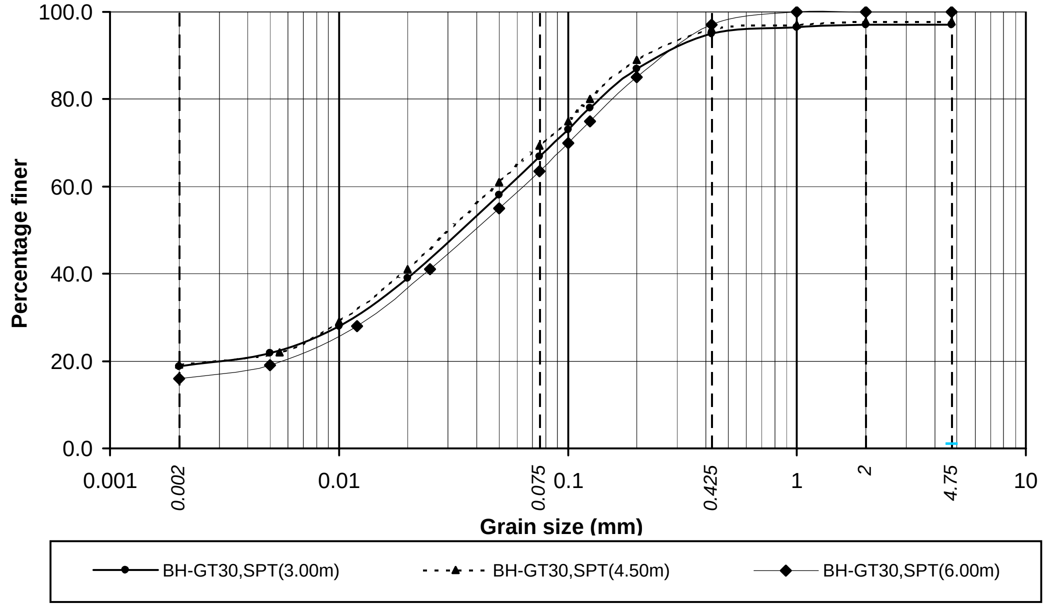
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT29,SPT(19.50m)	9.5		87.30	3.2
BH-GT29,SPT(25.50m)	4.0		85.40	10.6
BH-GT30,SPT(1.50m)	22.6	45.3	27.60	4.5

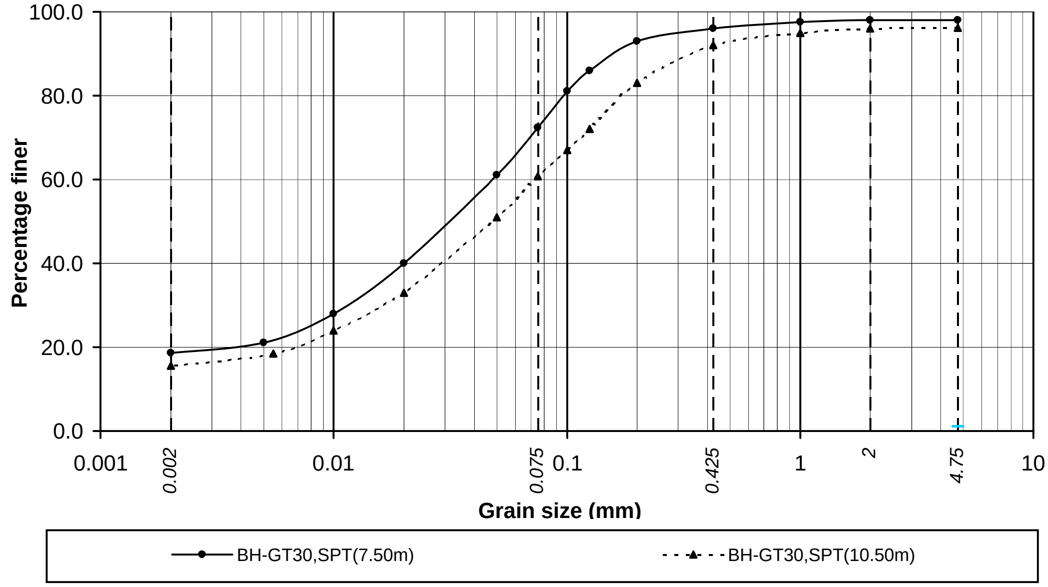
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT30,SPT(3.00m)	18.8	48.1	30.10	3.0
BH-GT30,SPT(4.50m)	19.2	50.2	28.40	2.2
BH-GT30,SPT(6.00m)	16.0	47.5	36.50	0.0

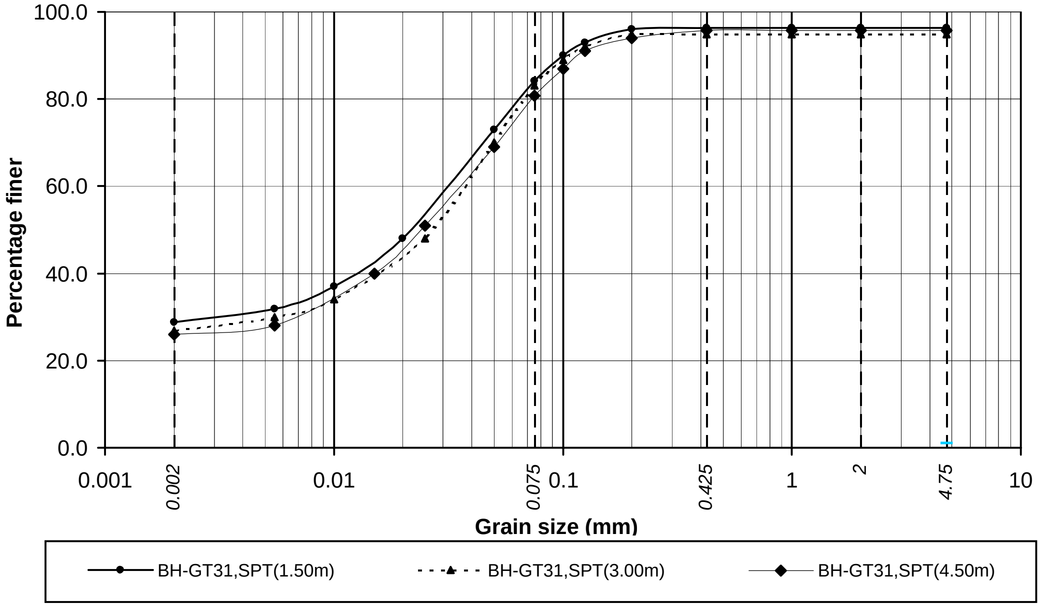
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT30,SPT(7.50m)	18.7	51.6	27.70	2.0
BH-GT30,SPT(10.50m)	15.5	45.2	35.50	3.8

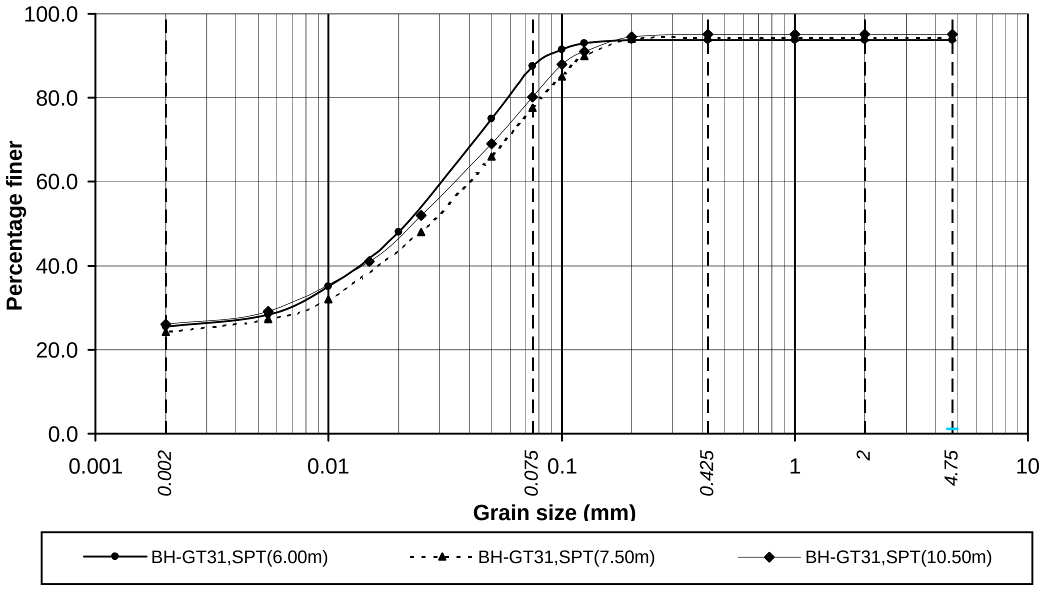
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT31,SPT(1.50m)	28.8	55.3	12.30	3.6
BH-GT31,SPT(3.00m)	26.9	56.2	11.80	5.1
BH-GT31,SPT(4.50m)	26.0	54.7	15.10	4.2

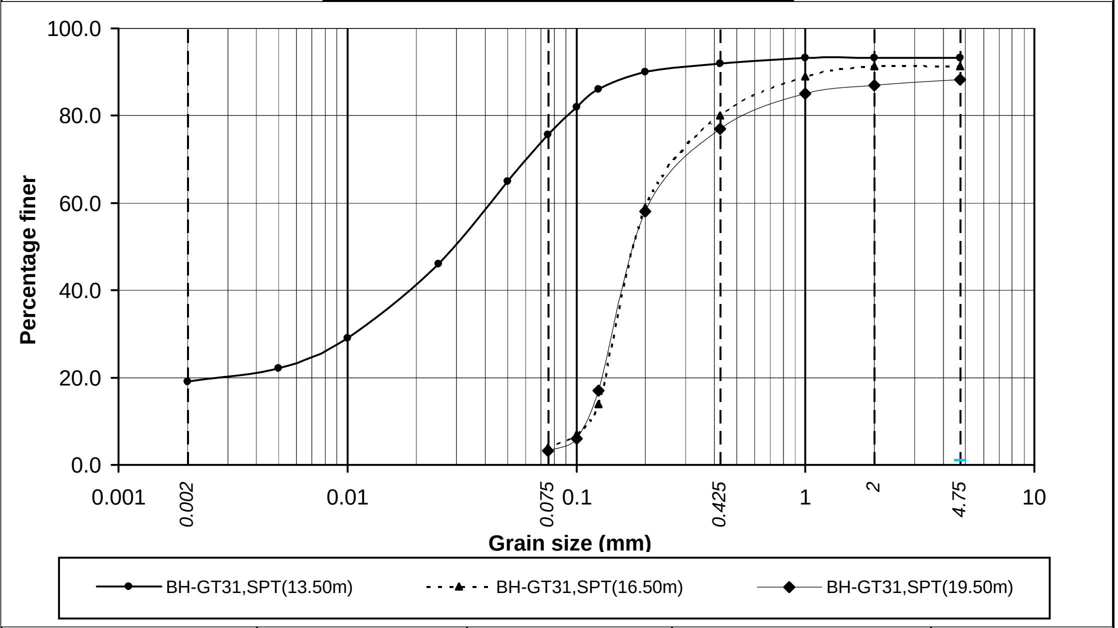
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT31,SPT(6.00m)	25.4	55.8	12.50	6.3
BH-GT31,SPT(7.50m)	24.3	53.3	16.70	5.7
BH-GT31,SPT(10.50m)	26.1	54.1	14.90	4.9

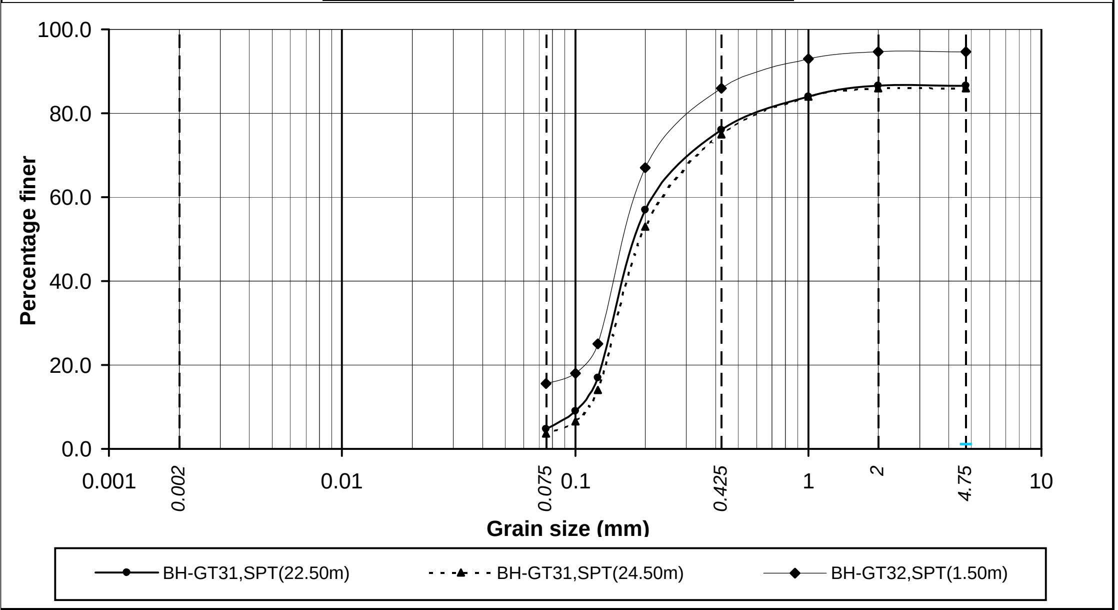
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT31,SPT(13.50m)	19.1	56.6	17.60	6.7
BH-GT31,SPT(16.50m)	4.0		87.40	8.6
BH-GT31,SPT(19.50m)	3.2		85.10	11.7

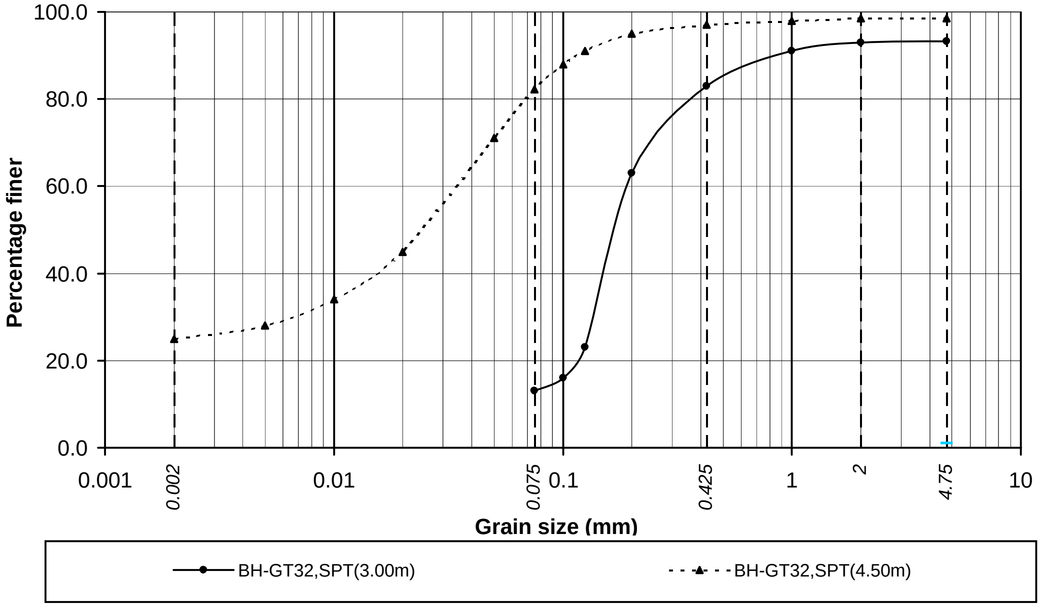
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT31,SPT(22.50m)	4.8		81.70	13.5
BH-GT31,SPT(24.50m)	3.6		82.30	14.1
BH-GT32,SPT(1.50m)	15.5		79.20	5.3

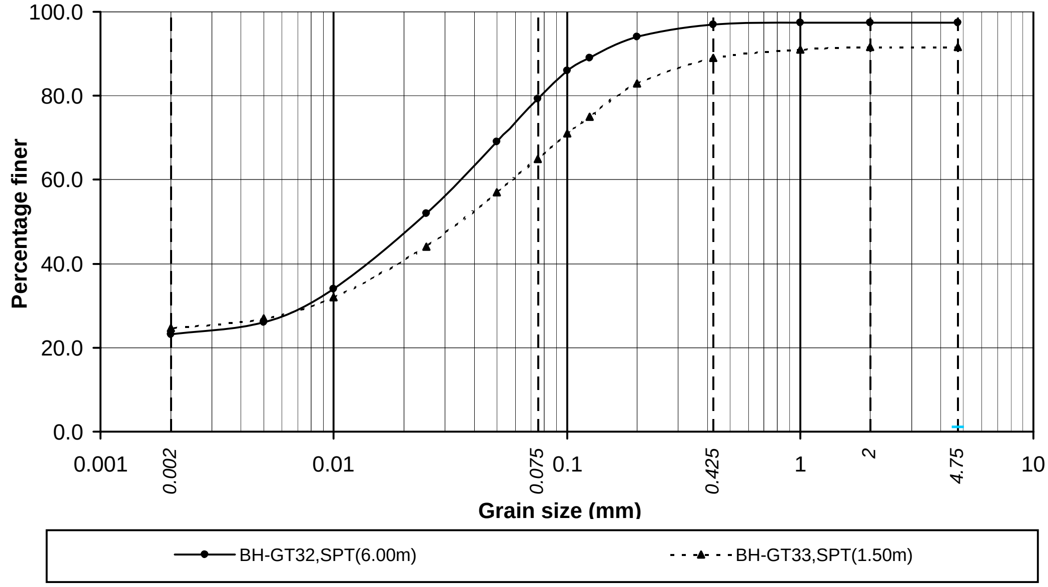
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT32,SPT(3.00m)	13.1		80.10	6.8
BH-GT32,SPT(4.50m)	25.0	57.2	16.30	1.5

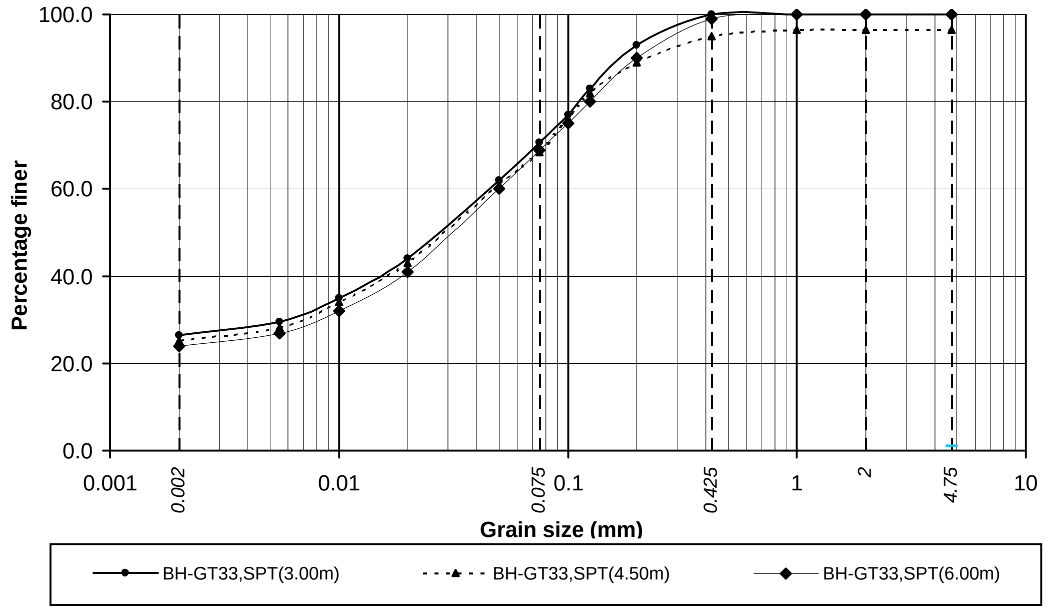
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT32,SPT(6.00m)	23.1	56.1	18.20	2.6
BH-GT33,SPT(1.50m)	24.7	40.2	26.70	8.4

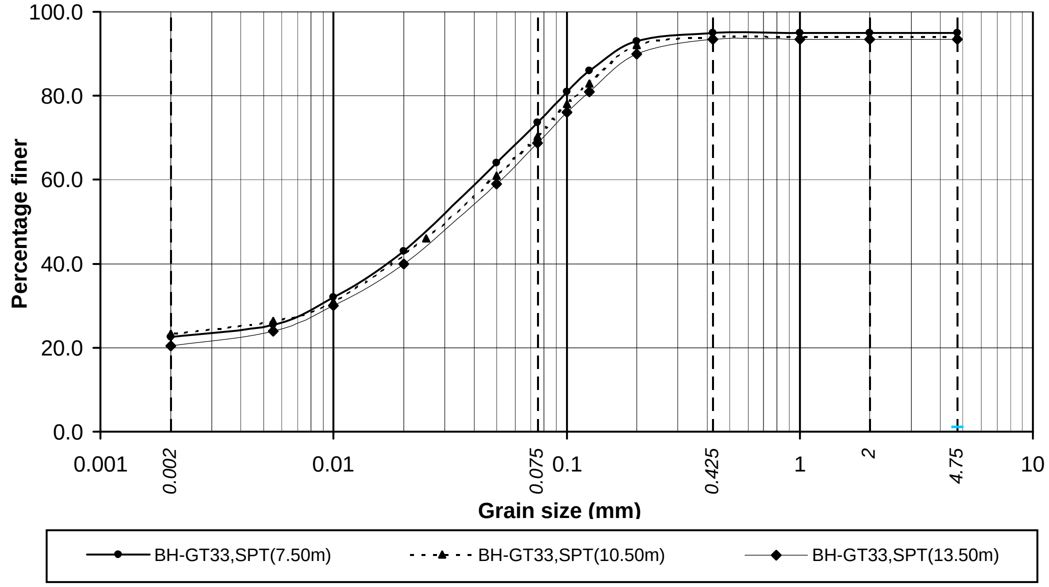
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT33,SPT(3.00m)	26.5	44.1	29.40	0.0
BH-GT33,SPT(4.50m)	25.2	43.3	28.00	3.5
BH-GT33,SPT(6.00m)	23.9	45.0	31.10	0.0

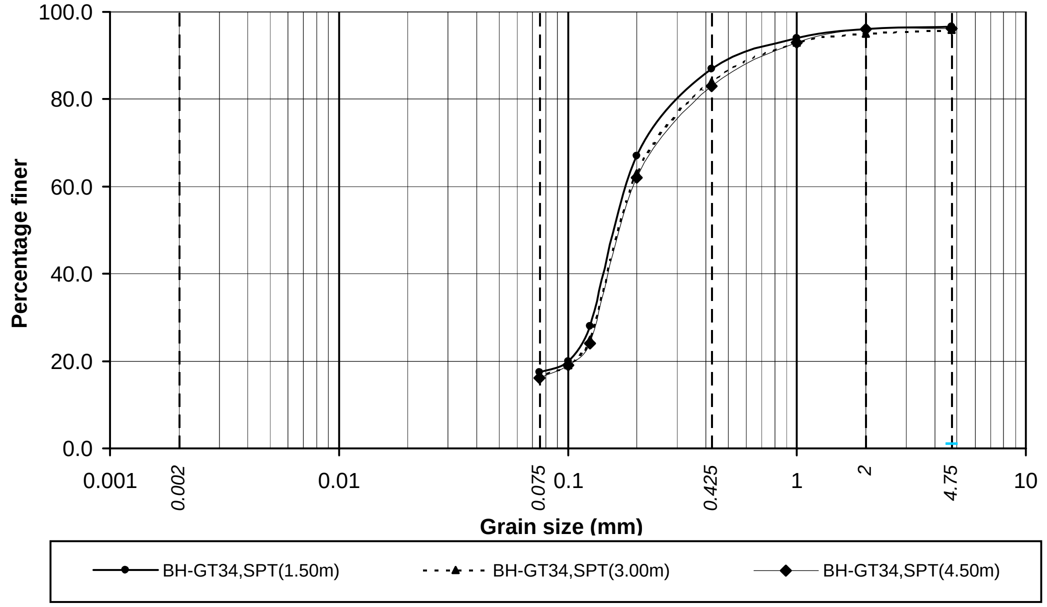
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT33,SPT(7.50m)	22.5	46.1	26.30	5.1
BH-GT33,SPT(10.50m)	23.3	47.0	23.70	6.0
BH-GT33,SPT(13.50m)	20.5	48.2	24.80	6.5

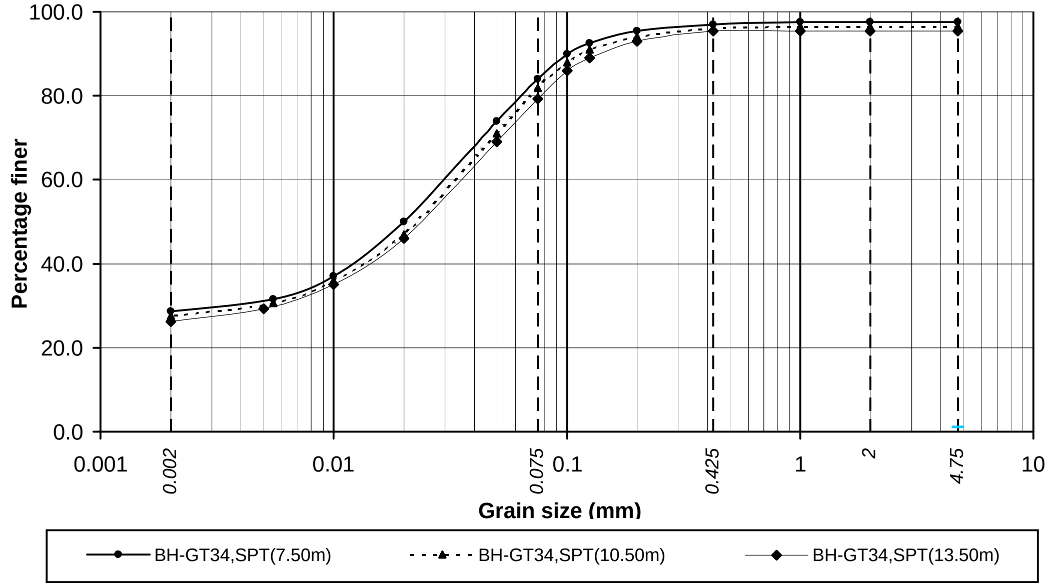
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT34,SPT(1.50m)	17.5		79.20	3.3
BH-GT34,SPT(3.00m)	16.7		79.20	4.1
BH-GT34,SPT(4.50m)	16.1		80.10	3.8

GRAIN SIZE DISTRIBUTION CURVES

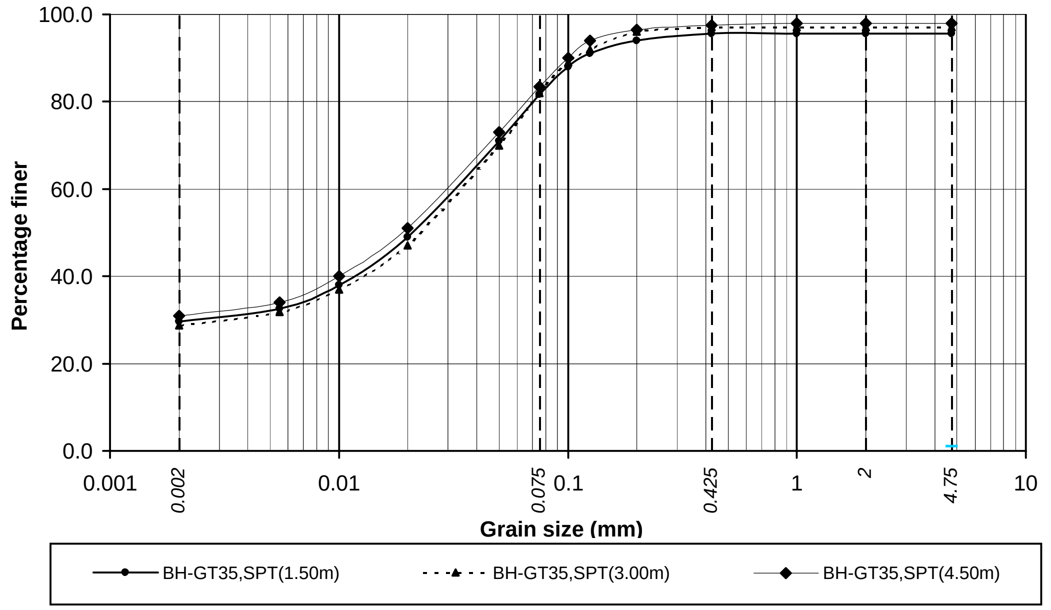


Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT34,SPT(7.50m)	28.6	55.4	13.60	2.4
BH-GT34,SPT(10.50m)	27.6	54.2	14.70	3.5
BH-GT34,SPT(13.50m)	26.2	53.0	16.20	4.6

*Silt & Clay

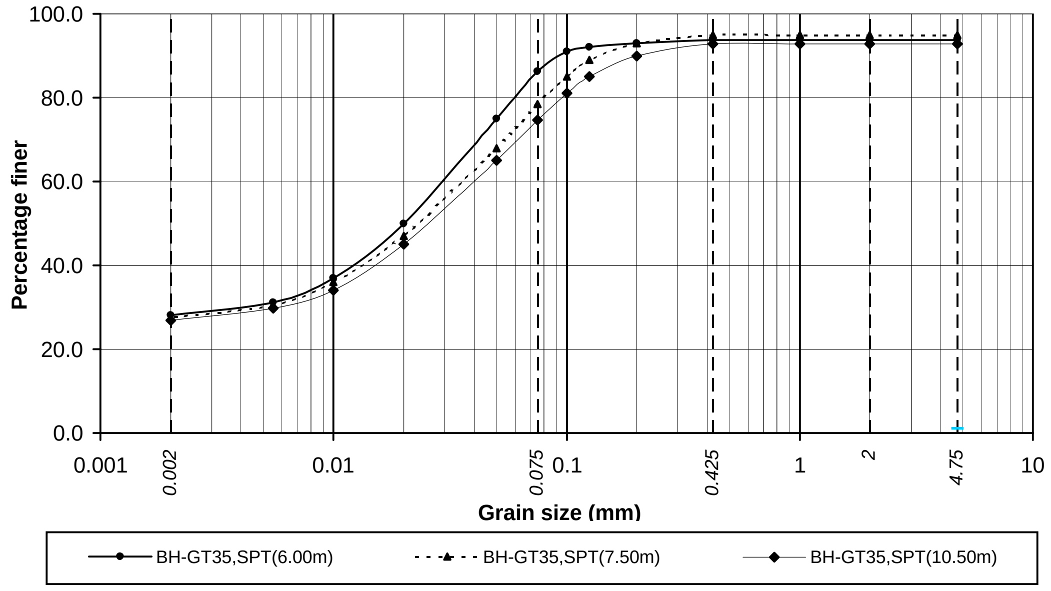
Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT35,SPT(1.50m)	29.6	52.1	13.90	4.4
BH-GT35,SPT(3.00m)	28.8	53.2	15.00	3.0
BH-GT35,SPT(4.50m)	31.0	52.5	14.40	2.1

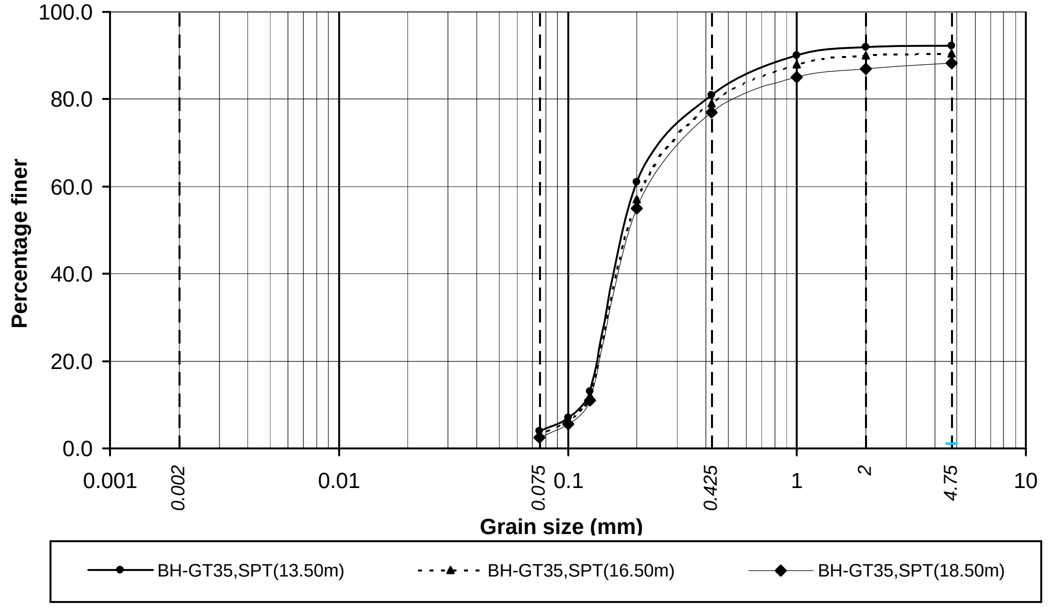
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT35,SPT(6.00m)	28.1	51.9	13.70	6.3
BH-GT35,SPT(7.50m)	27.6	50.8	16.60	5.0
BH-GT35,SPT(10.50m)	26.8	47.9	18.10	7.2

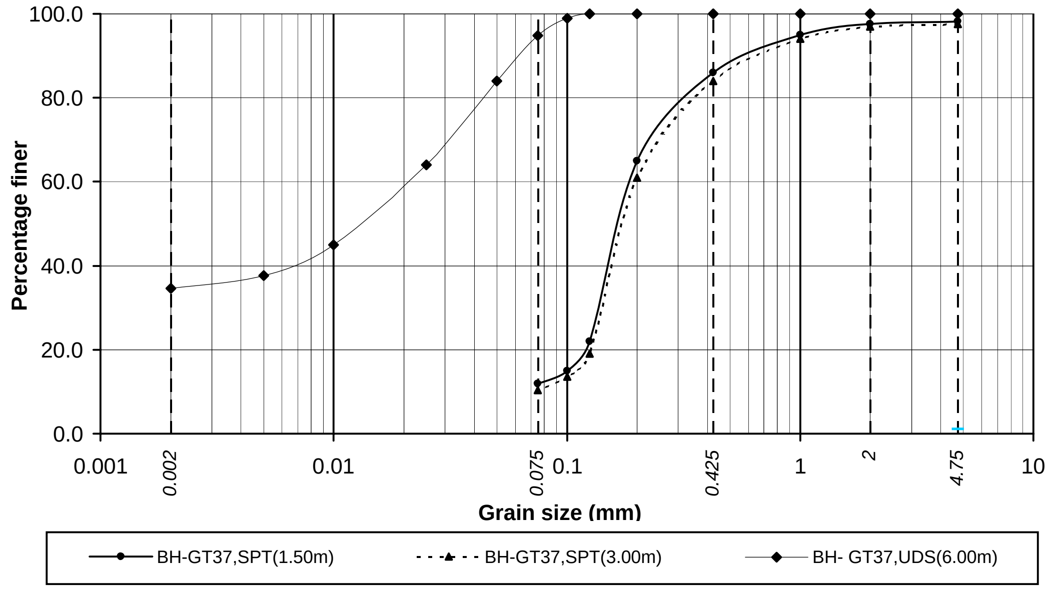
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT35,SPT(13.50m)	4.0		88.30	7.7
BH-GT35,SPT(16.50m)	3.2		87.20	9.6
BH-GT35,SPT(18.50m)	2.5		85.70	11.8

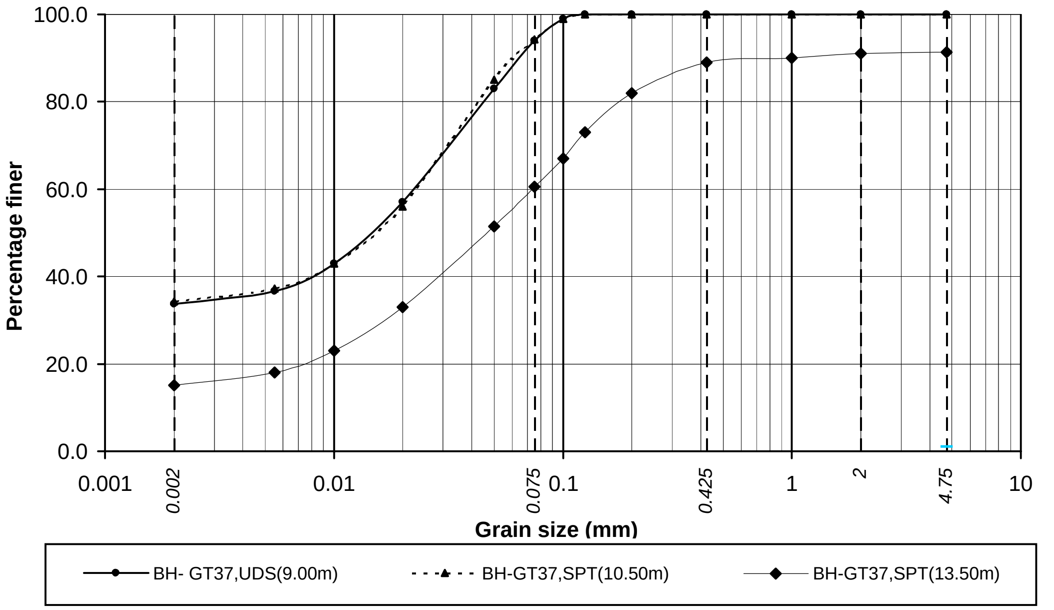
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT37,SPT(1.50m)	11.9		86.20	1.9
BH-GT37,SPT(3.00m)	10.4		87.10	2.5
BH- GT37,UDS(6.00m)	34.6	60.2	5.20	0.0

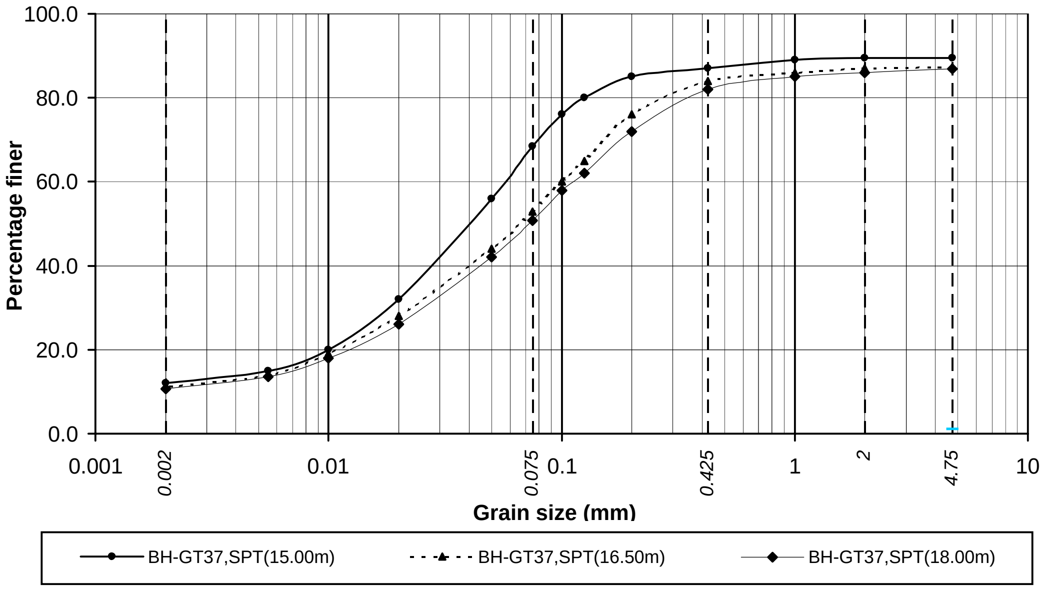
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH- GT37,UDS(9.00m)	33.7	60.3	6.00	0.0
BH-GT37,SPT(10.50m)	34.3	60.0	5.70	0.0
BH-GT37,SPT(13.50m)	15.1	45.4	30.90	8.6

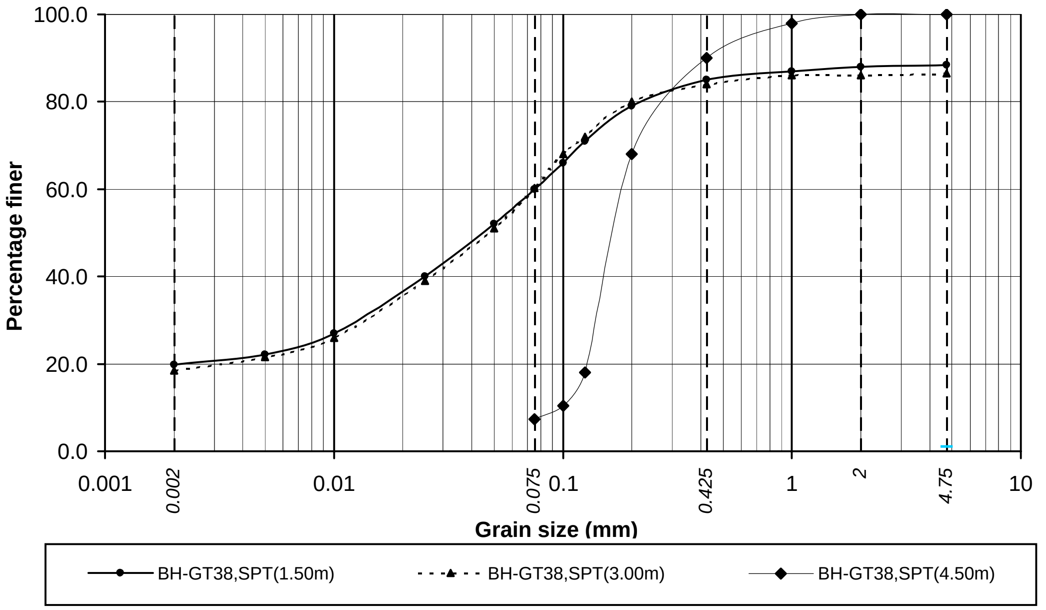
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT37,SPT(15.00m)	12.0	46.0	31.50	10.5
BH-GT37,SPT(16.50m)	11.1	41.8	34.40	12.7
BH-GT37,SPT(18.00m)	10.6	40.2	36.10	13.1

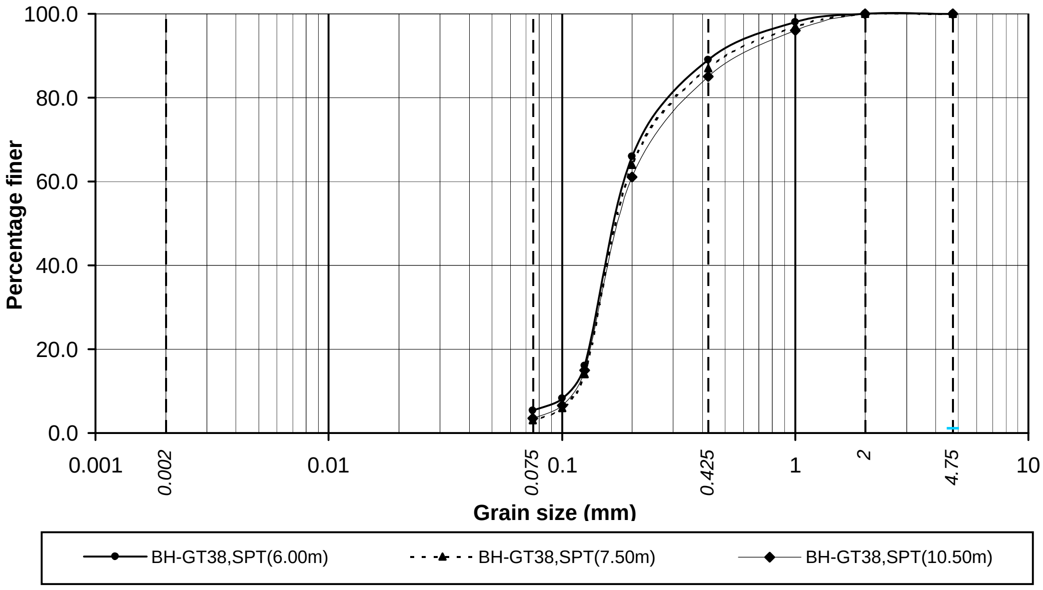
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT38,SPT(1.50m)	19.8	40.2	28.40	11.6
BH-GT38,SPT(3.00m)	41.7		26.30	13.5
BH-GT38,SPT(4.50m)	7.4		92.60	0.0

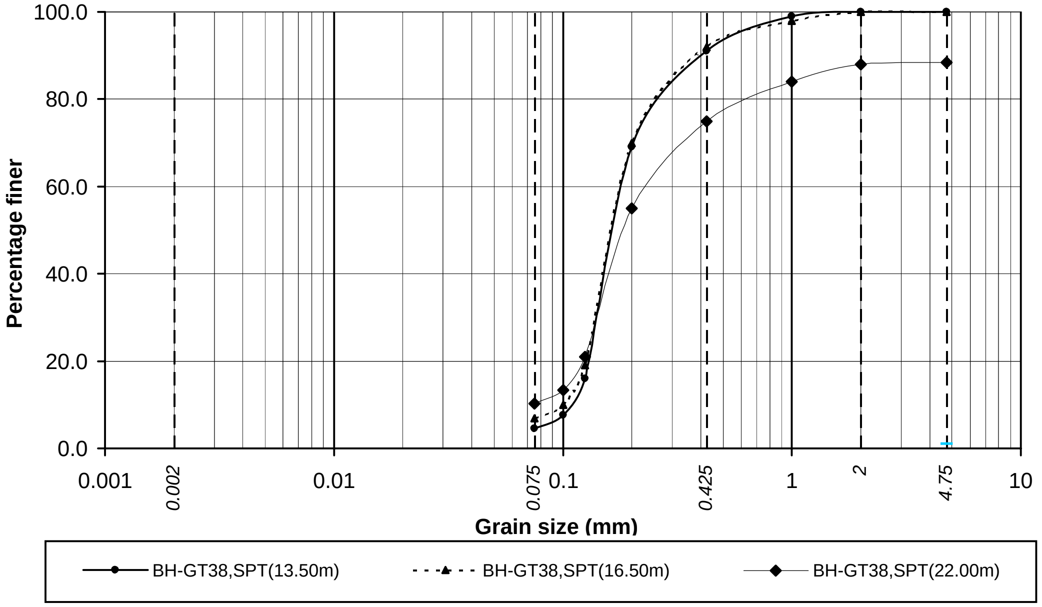
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT38,SPT(6.00m)	5.3		94.70	0.0
BH-GT38,SPT(7.50m)	3.0		97.00	0.0
BH-GT38,SPT(10.50m)	3.5		96.50	0.0

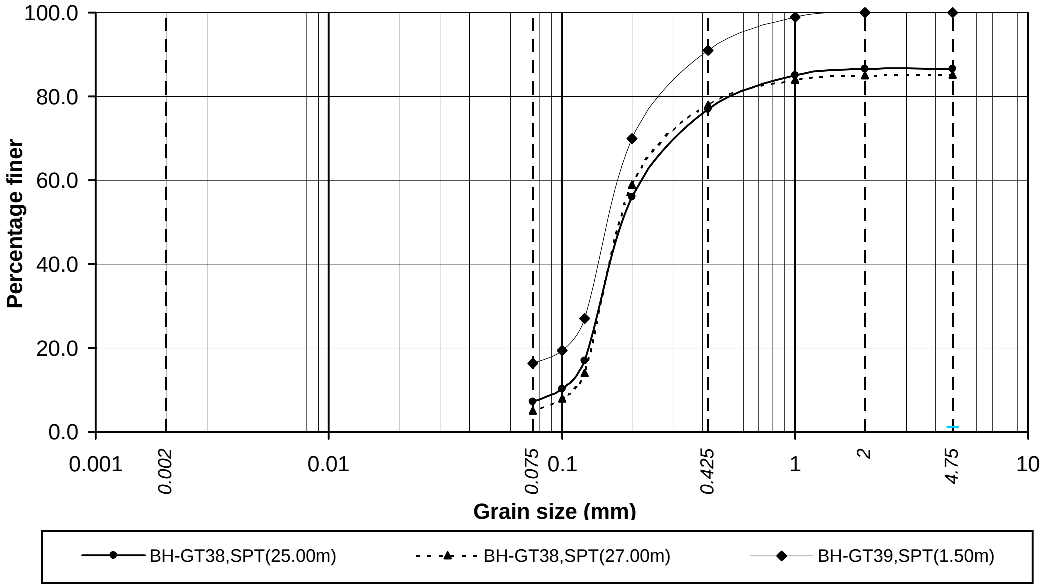
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT38,SPT(13.50m)	4.6		95.40	0.0
BH-GT38,SPT(16.50m)	6.9		93.10	0.0
BH-GT38,SPT(22.00m)	10.3		78.10	11.6

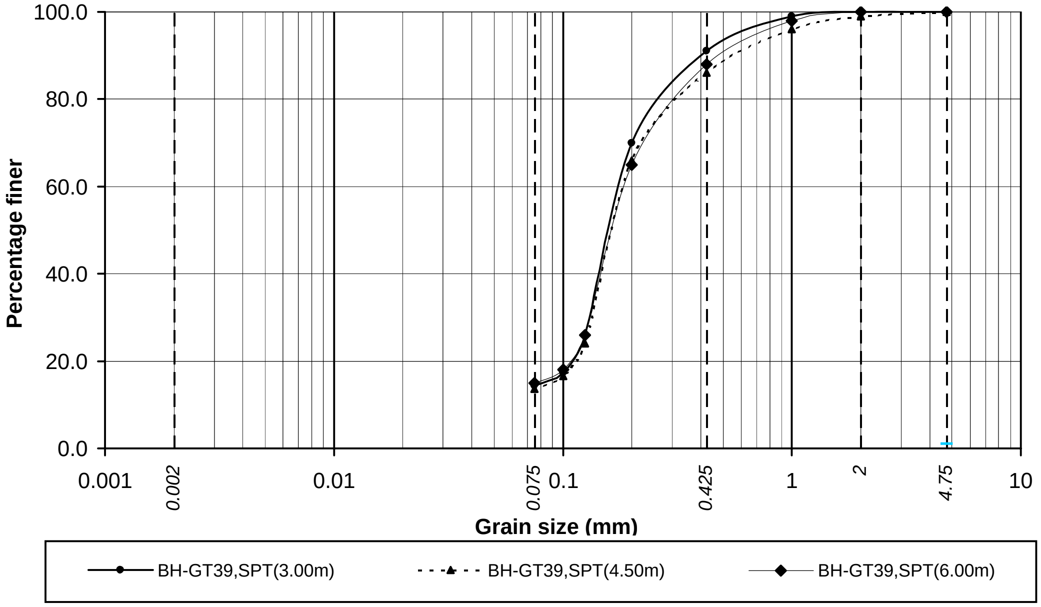
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT38,SPT(25.00m)	7.2		79.30	13.5
BH-GT38,SPT(27.00m)	5.0		80.20	14.8
BH-GT39,SPT(1.50m)	16.4		83.60	0.0

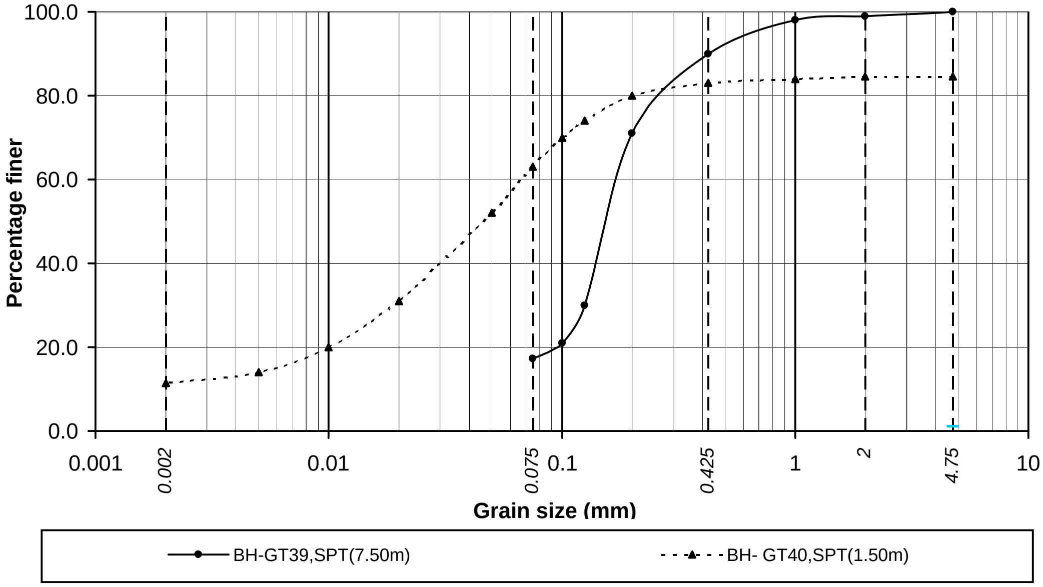
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT39,SPT(3.00m)	14.3		85.70	0.0
BH-GT39,SPT(4.50m)	13.6		86.40	0.0
BH-GT39,SPT(6.00m)	15.0		85.00	0.0

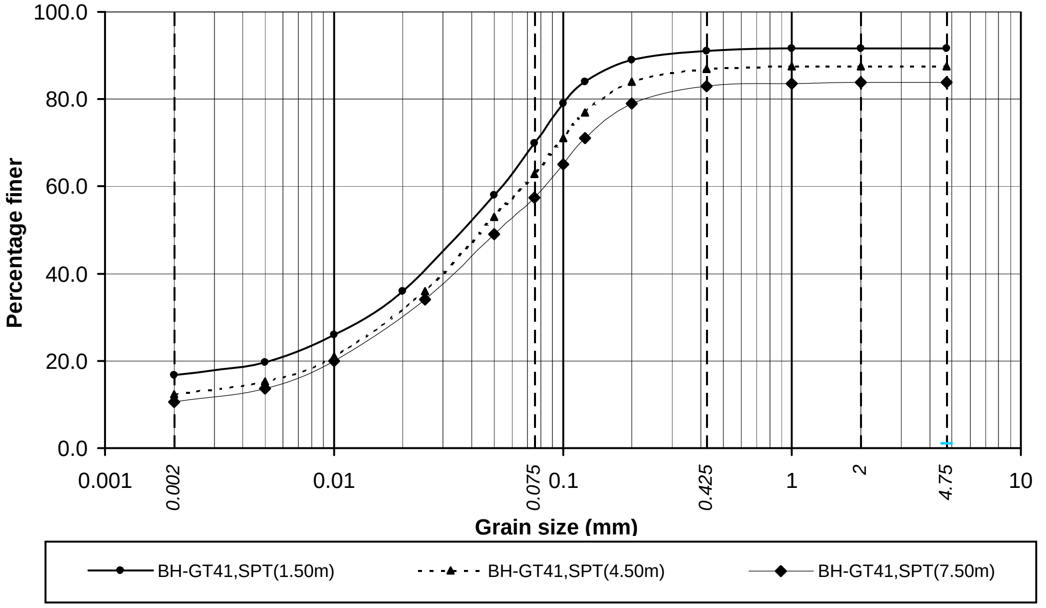
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT39,SPT(7.50m)	17.3		82.70	0.0
BH- GT40,SPT(1.50m)	11.5	51.5	21.60	15.4

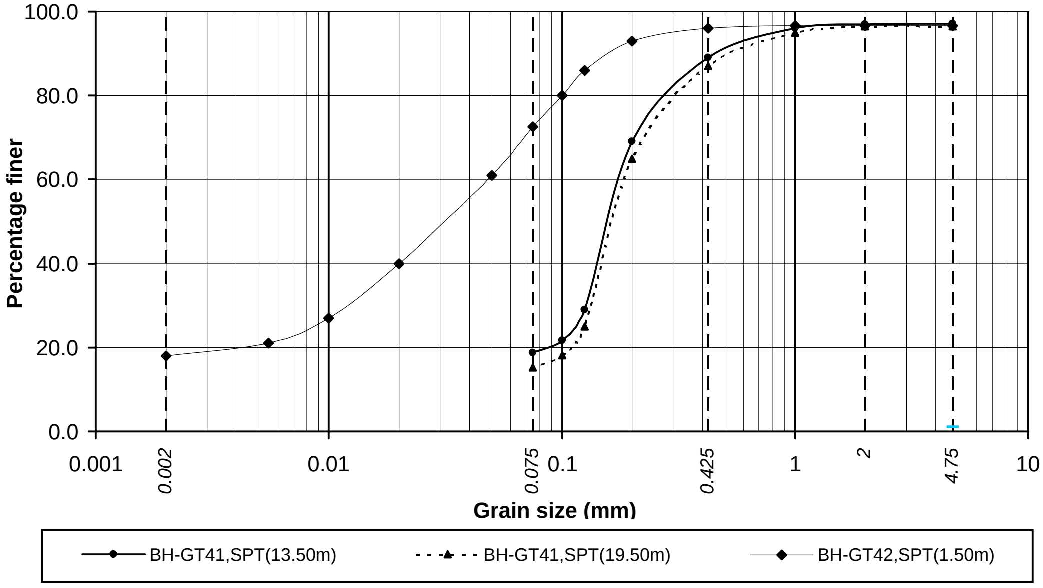
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT41,SPT(1.50m)	16.7	53.2	21.70	8.4
BH-GT41,SPT(4.50m)	12.3	50.6	24.60	12.5
BH-GT41,SPT(7.50m)	10.6	46.8	26.50	16.1

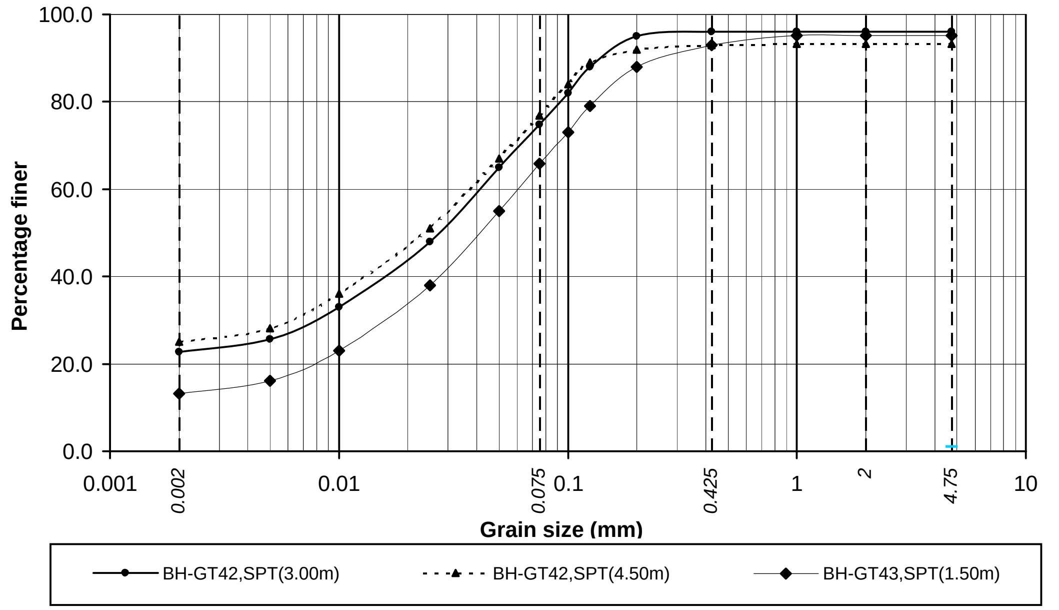
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT41,SPT(13.50m)	18.7		78.40	2.9
BH-GT41,SPT(19.50m)	15.2		81.30	3.5
BH-GT42,SPT(1.50m)	18.0	54.6	24.10	3.3

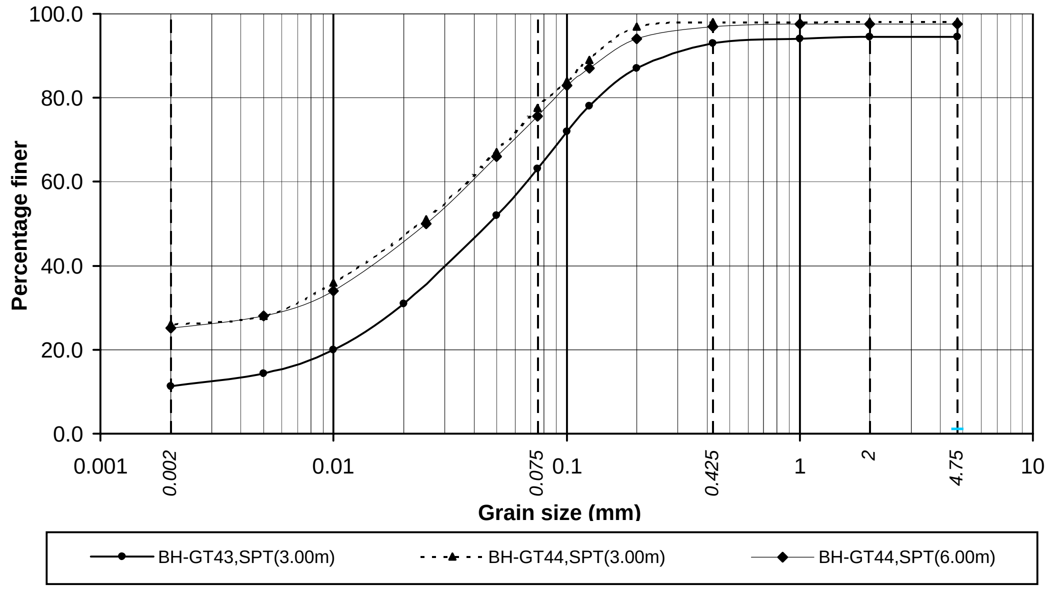
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT42,SPT(3.00m)	22.7	52.1	21.20	4.0
BH-GT42,SPT(4.50m)	25.1	51.7	18.50	4.7
BH-GT43,SPT(1.50m)	13.2	52.6	29.40	4.8

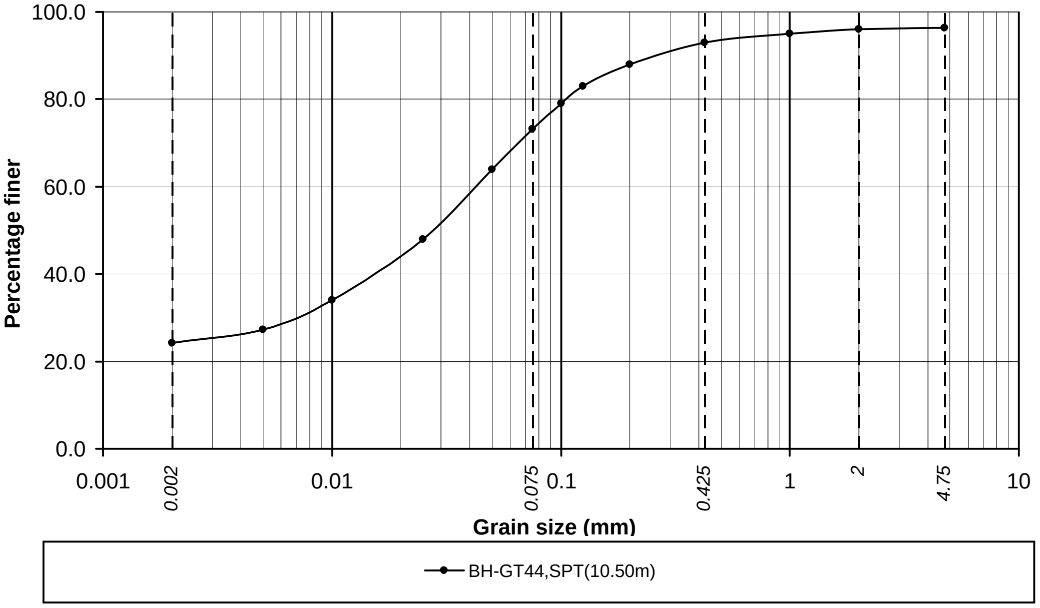
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT43,SPT(3.00m)	11.3	51.8	31.40	5.5
BH-GT44,SPT(3.00m)	26.0	51.6	20.60	1.8
BH-GT44,SPT(6.00m)	25.1	50.5	21.90	2.5

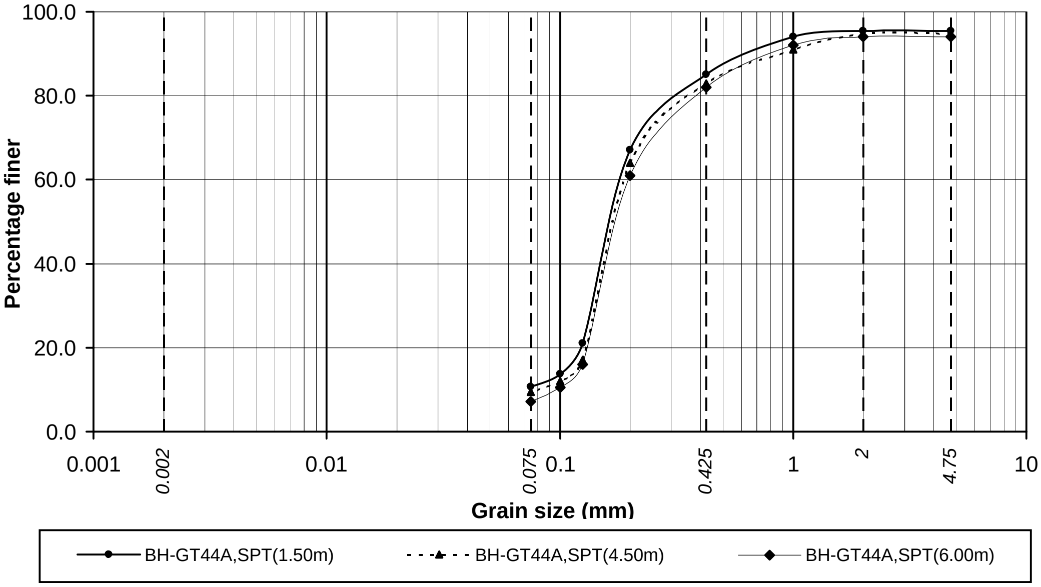
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT44,SPT(10.50m)	24.2	49.0	23.20	3.6

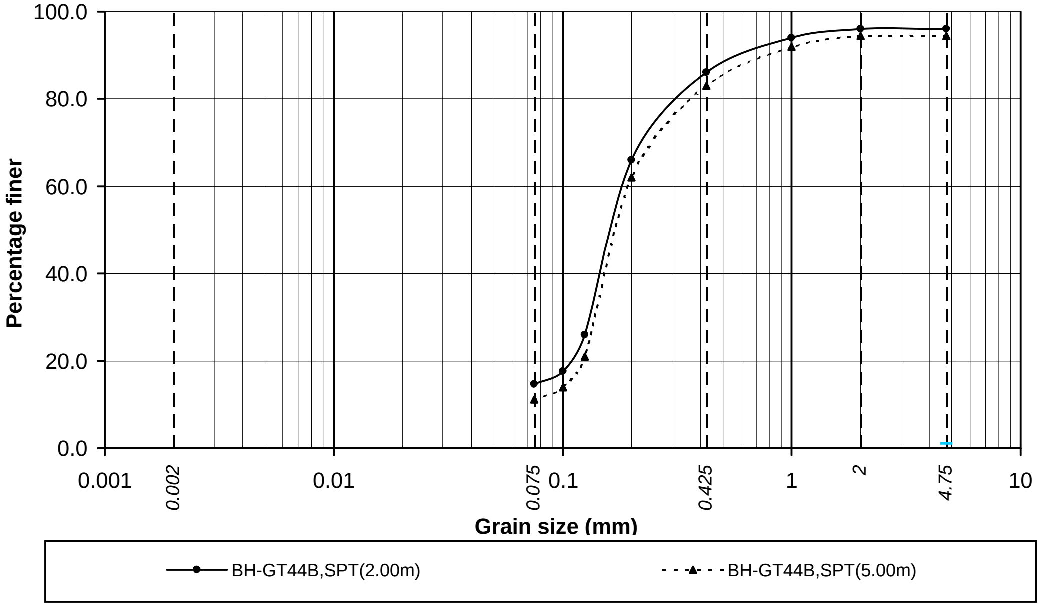
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT44A,SPT(1.50m)	10.7		84.70	4.6
BH-GT44A,SPT(4.50m)	9.5		85.30	5.2
BH-GT44A,SPT(6.00m)	7.2		86.80	6.0

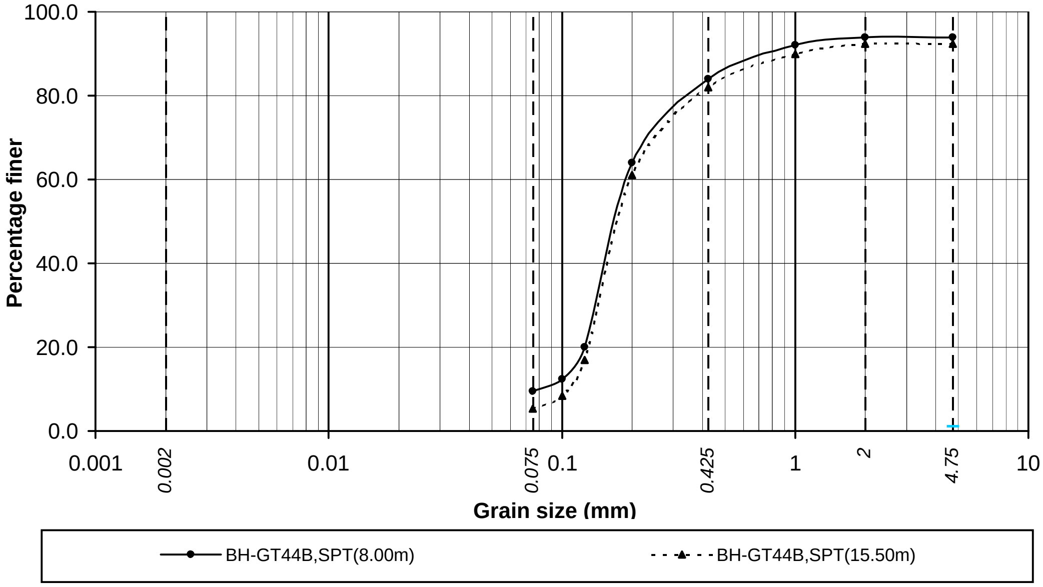
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT44B,SPT(2.00m)	14.6		81.40	4.0
BH-GT44B,SPT(5.00m)	11.2		83.30	5.5

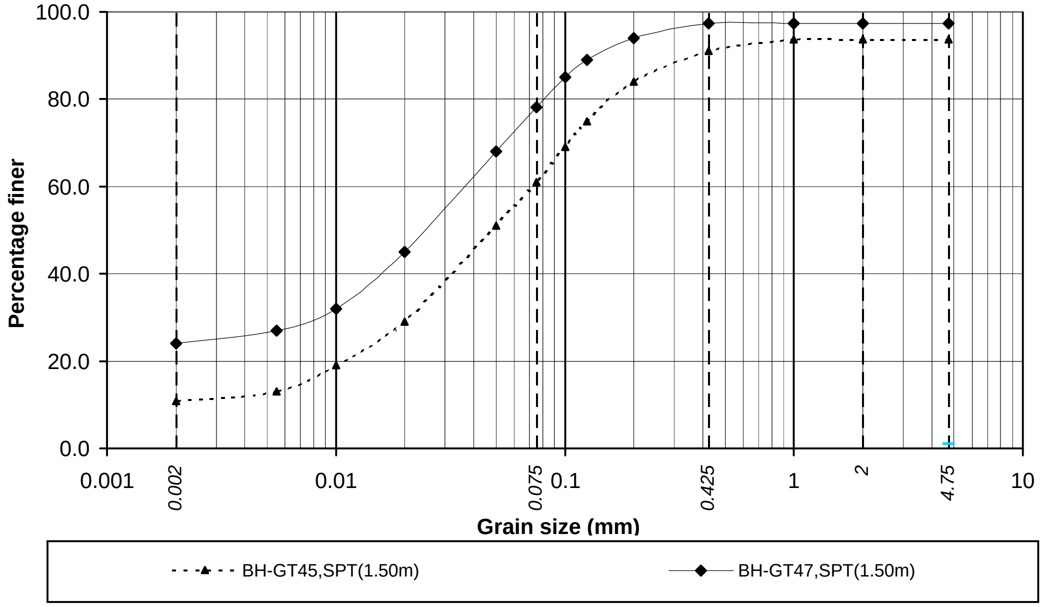
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT44B,SPT(8.00m)	9.4		84.50	6.1
BH-GT44B,SPT(15.50m)	5.4		87.00	7.6

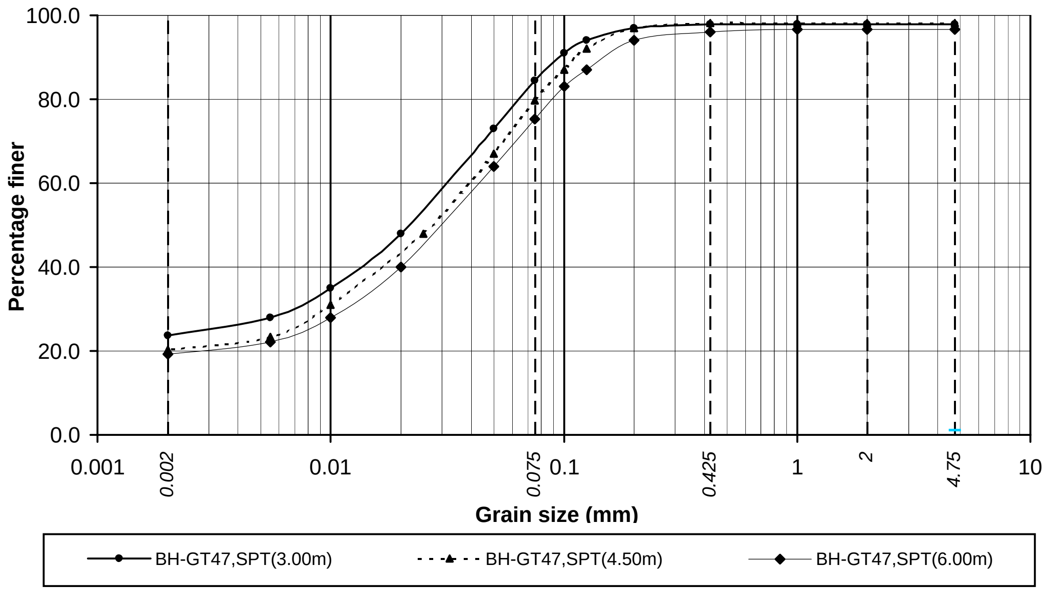
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT45,SPT(1.50m)	10.8	50.2	32.70	6.3
BH-GT47,SPT(1.50m)	24.1	54.0	19.30	2.6

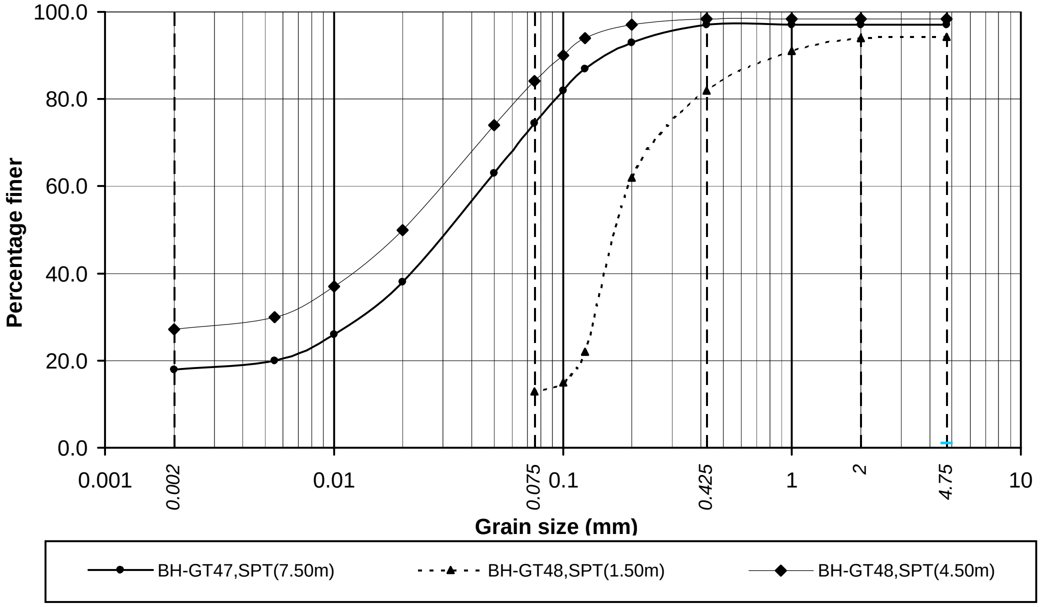
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT47,SPT(3.00m)	23.6	58.7	15.60	2.1
BH-GT47,SPT(4.50m)	20.3	59.4	18.40	1.9
BH-GT47,SPT(6.00m)	19.2	56.0	21.40	3.4

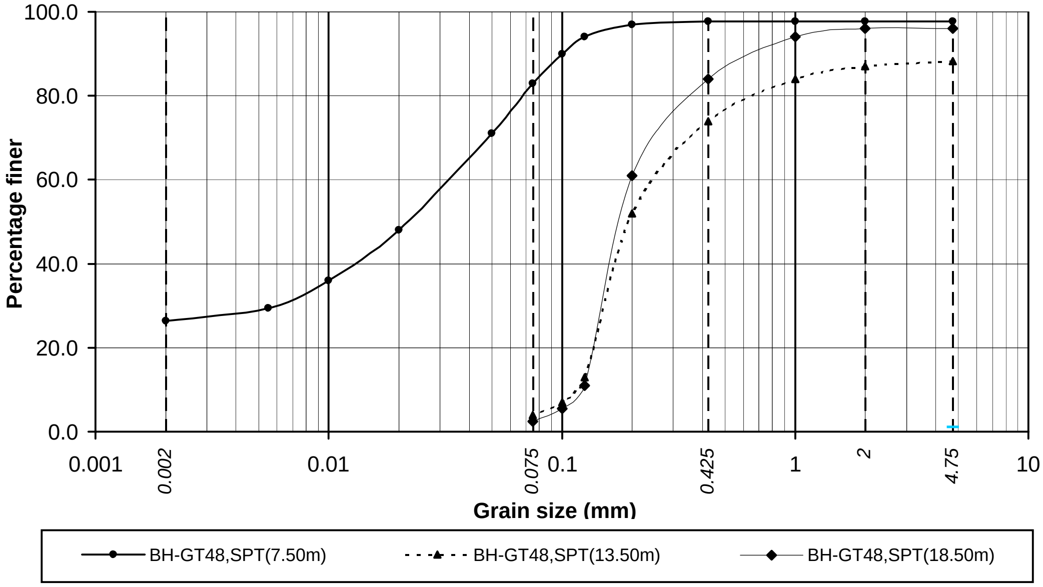
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT47,SPT(7.50m)	17.9	56.6	22.50	3.0
BH-GT48,SPT(1.50m)	12.9		81.30	5.8
BH-GT48,SPT(4.50m)	27.1	57.0	14.30	1.6

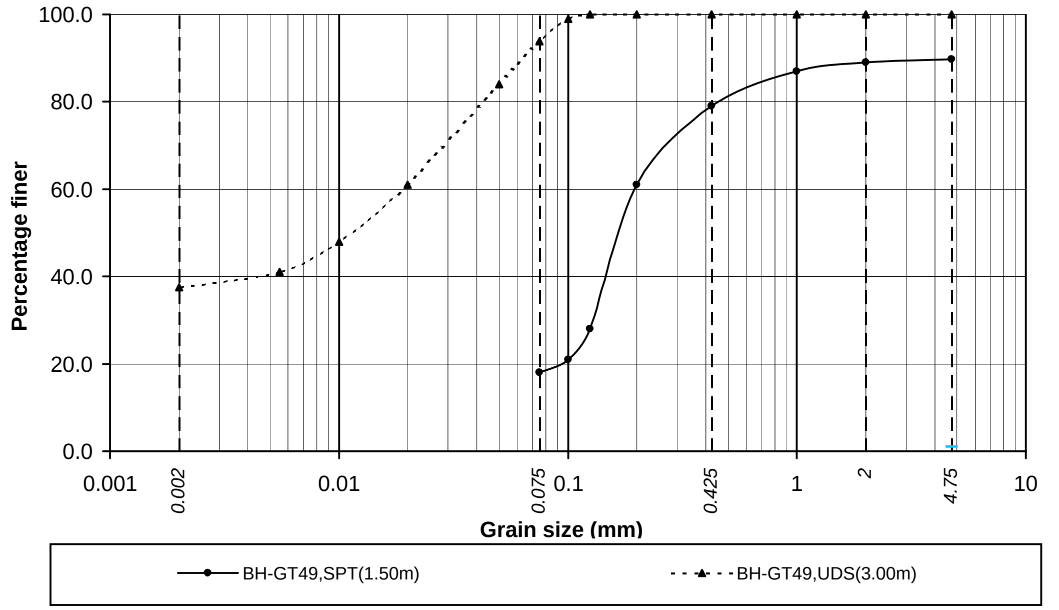
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT48,SPT(7.50m)	26.4	54.2	17.10	2.3
BH-GT48,SPT(13.50m)	4.0		84.30	11.7
BH-GT48,SPT(18.50m)	2.4		85.00	12.6

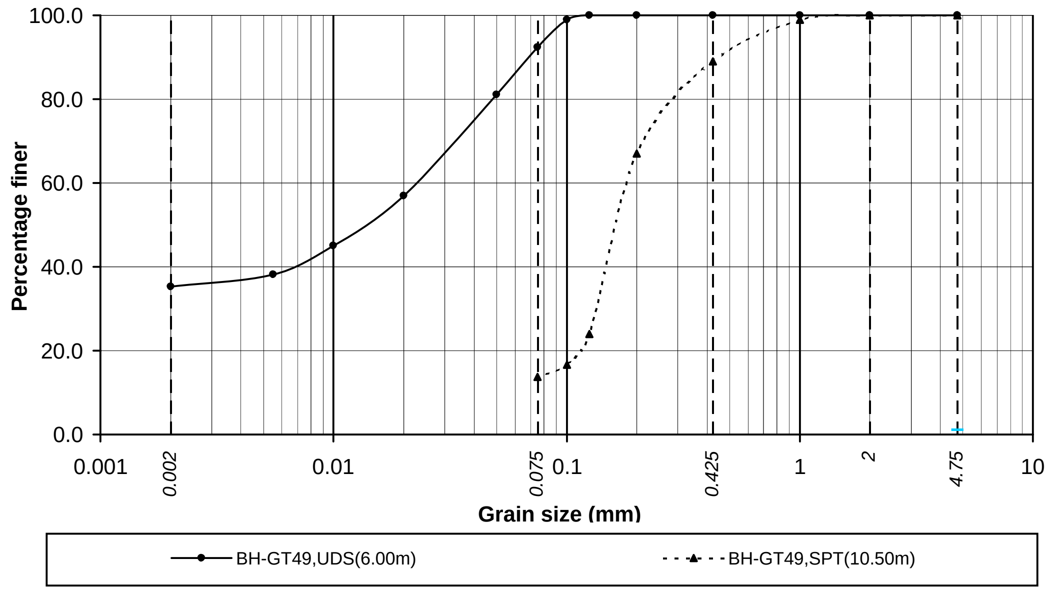
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT49,SPT(1.50m)	18.1		71.60	10.3
BH-GT49,UDS(3.00m)	37.5	56.3	6.20	0.0

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT49,UDS(6.00m)	35.2	57.2	7.60	0.0
BH-GT49,SPT(10.50m)	13.7		86.30	0.0

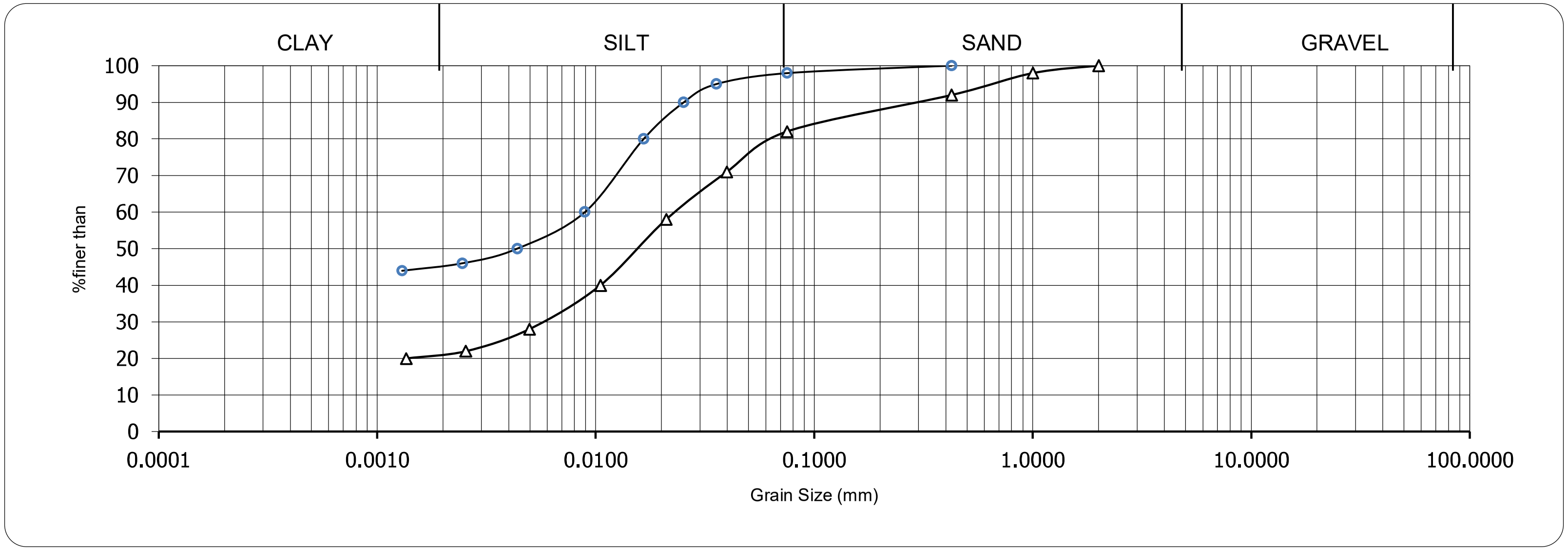
*Silt & Clay

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

GRAIN SIZE DISTRIBUTION CURVE



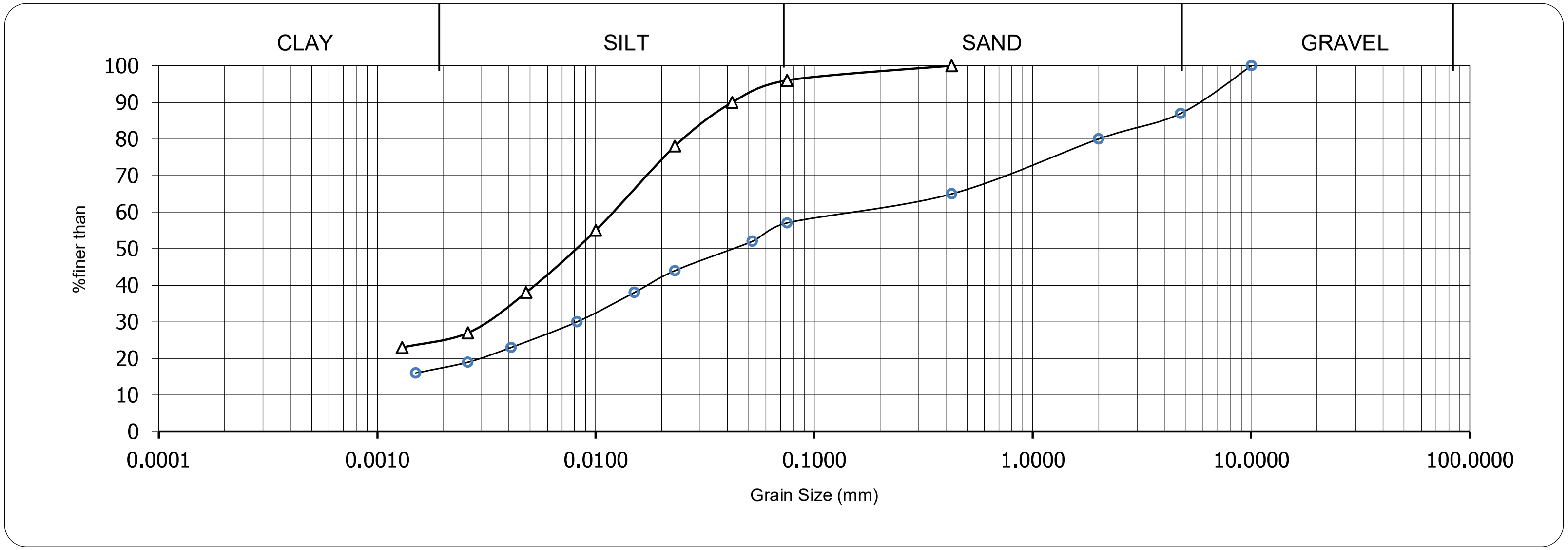
Symbol	BH NO	Depth (m)
○	GT 50B	3.0-3.45
△	GT 50B	6.0-6.45

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

GRAIN SIZE DISTRIBUTION CURVE



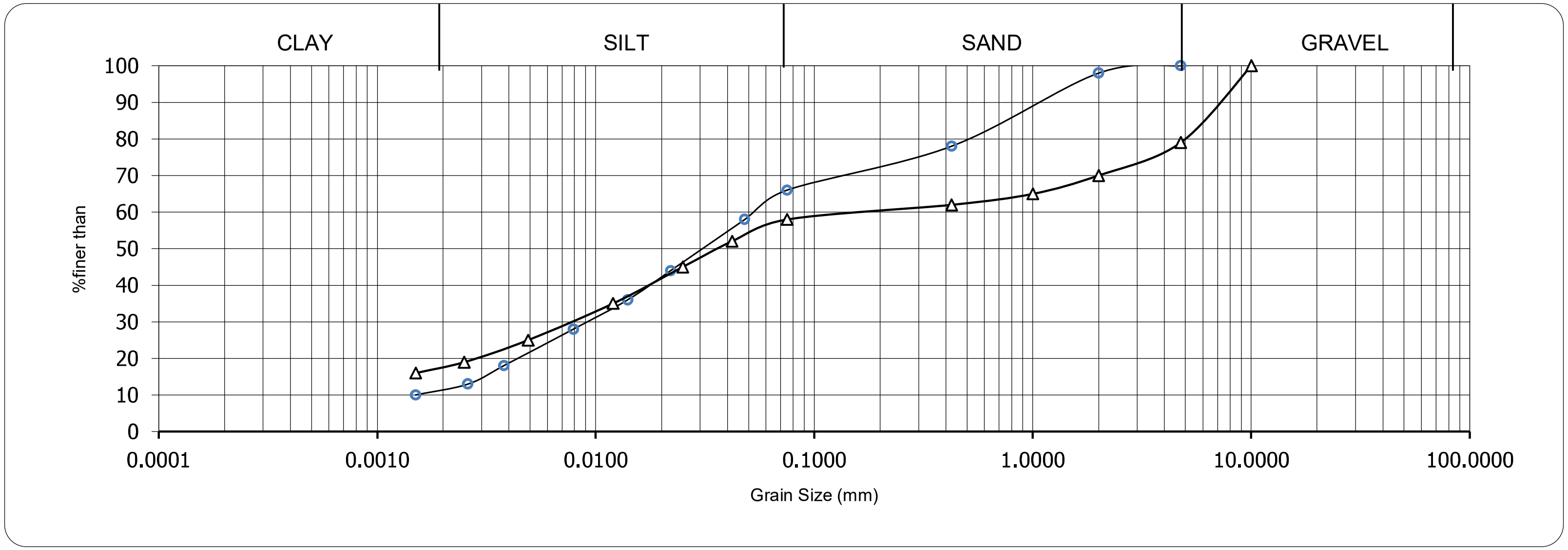
Symbol	BH NO	Depth (m)
○	GT51A	4.50-4.95
△	GT51A	13.50-13.95

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

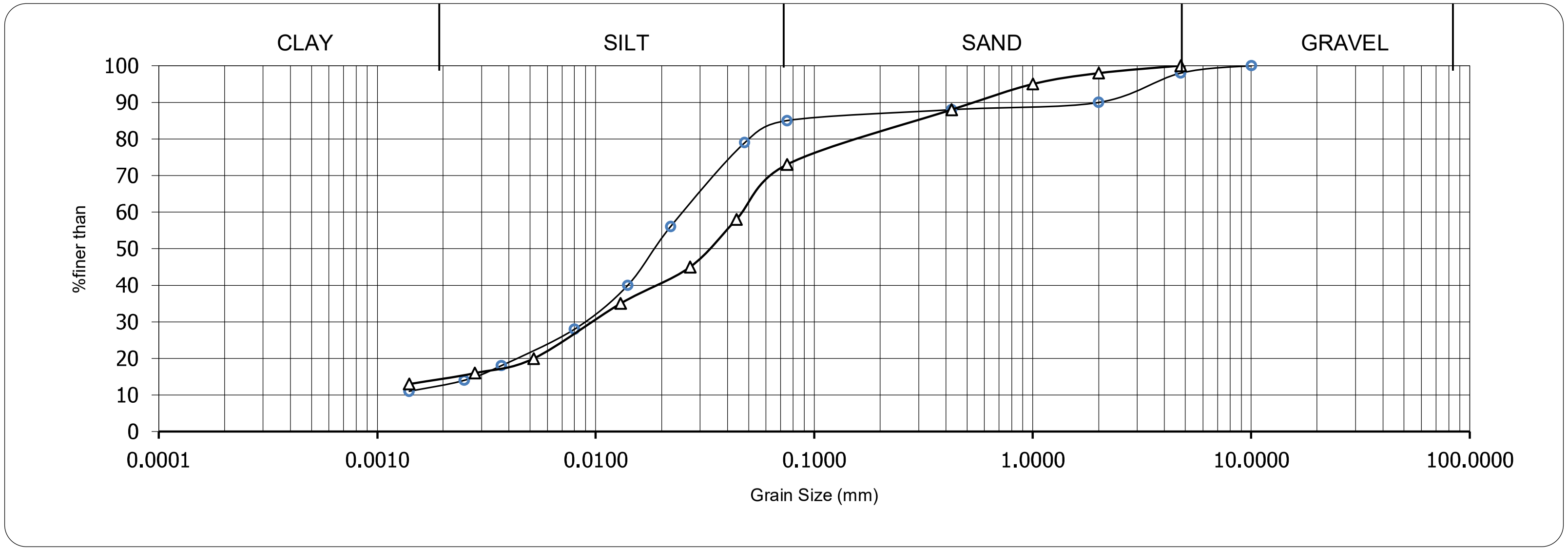
GRAIN SIZE DISTRIBUTION CURVE



Symbol	BH NO	Depth (m)
○	GT52A	3.0-3.45
△	GT52A	6.0-6.45

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

GRAIN SIZE DISTRIBUTION CURVE



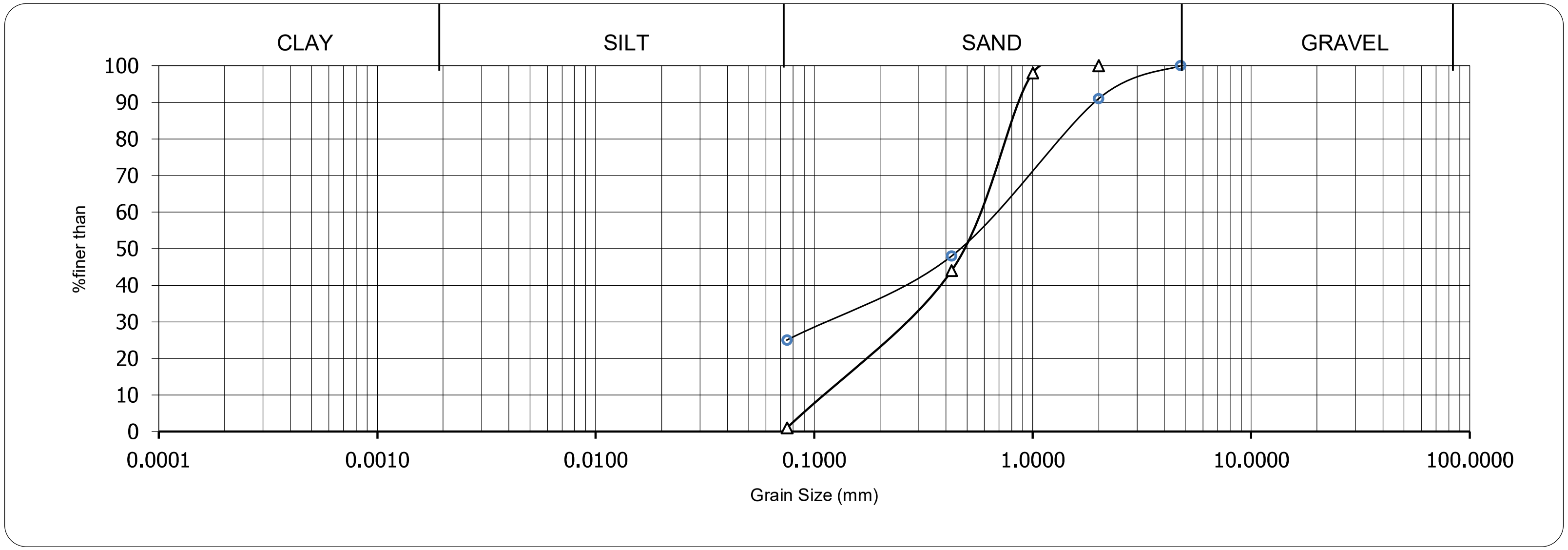
Symbol	BH NO	Depth (m)
○	GT53A	6.0-6.45
△	GT53A	10.50-10.95

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

GRAIN SIZE DISTRIBUTION CURVE



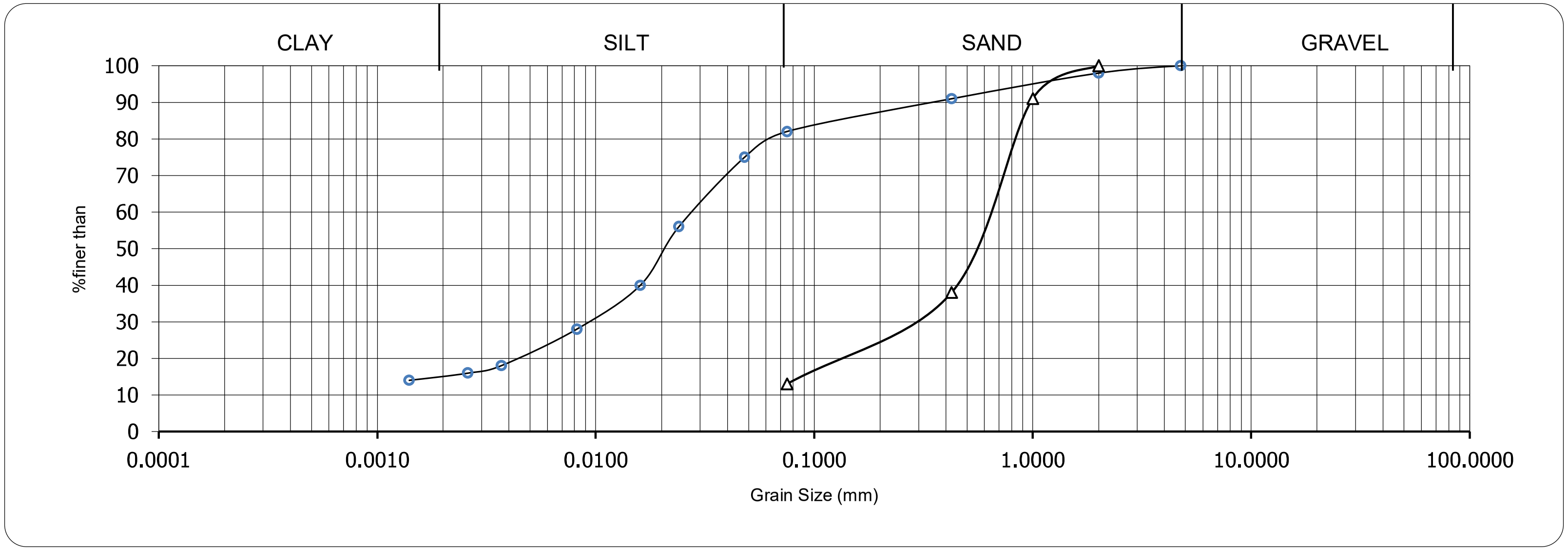
Symbol	BH NO	Depth (m)
○	GT54	4.50-4.95
△	GT54	13.50-13.95

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

GRAIN SIZE DISTRIBUTION CURVE



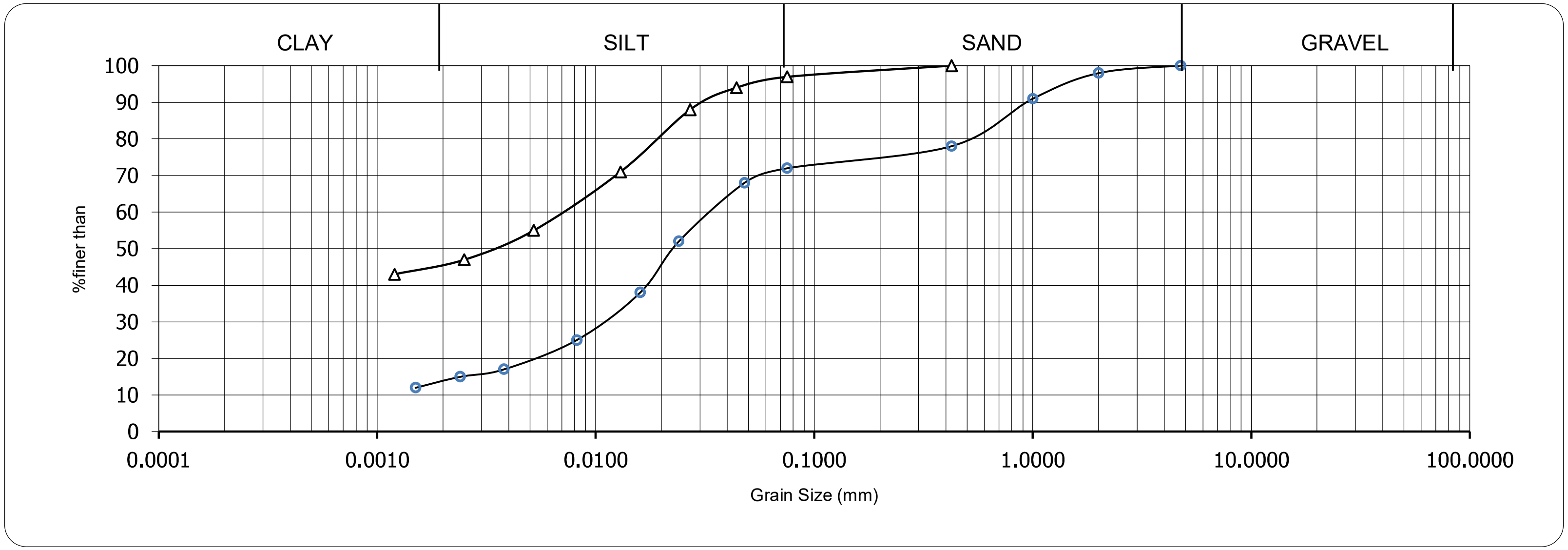
Symbol	BH NO	Depth (m)
○	GT57B	1.50-1.95
△	GT57B	4.50-4.95

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

GRAIN SIZE DISTRIBUTION CURVE



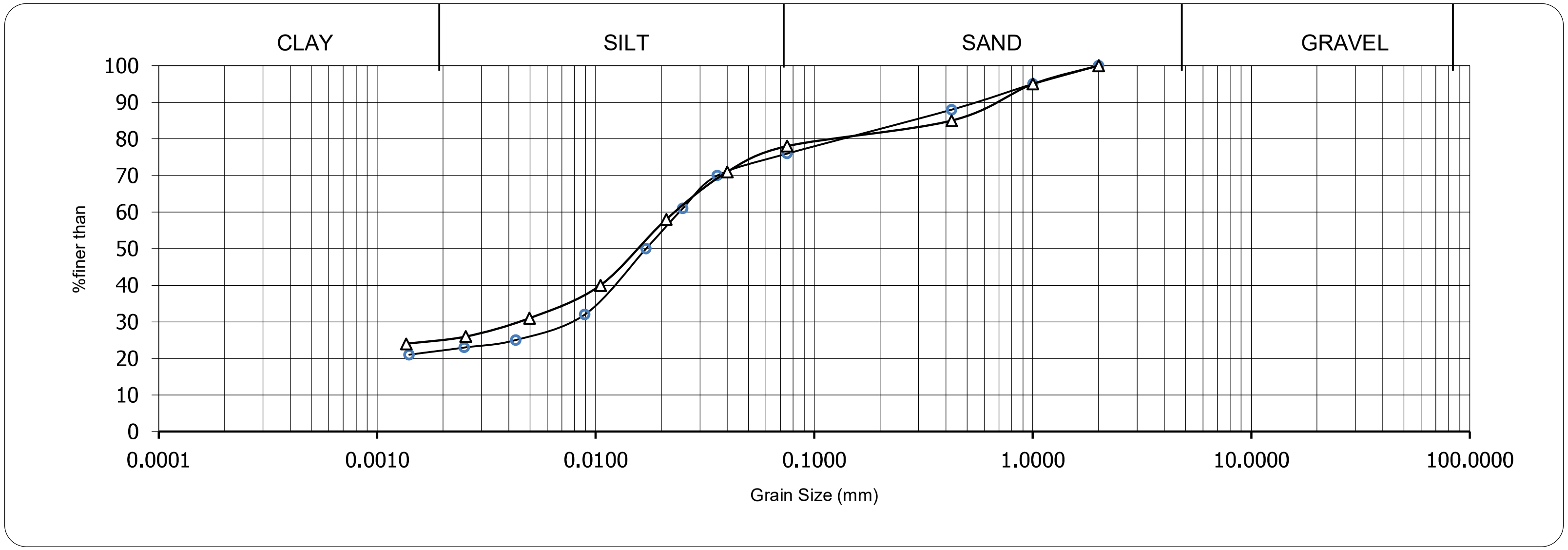
Symbol	BH NO	Depth (m)
○	GT58A	3.0-3.45
△	GT58A	10.50-10.95

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

GRAIN SIZE DISTRIBUTION CURVE



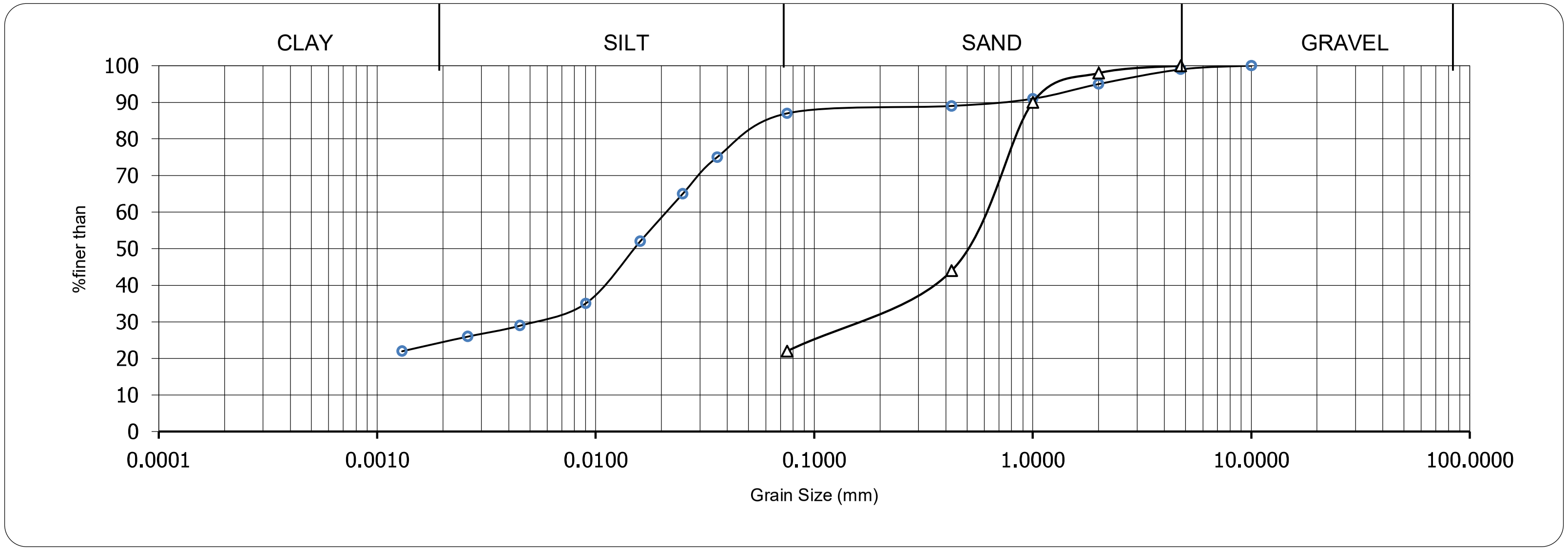
Symbol	BH NO	Depth (m)
○	GT60	4.50-4.95
△	GT60	10.50-10.95

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

GRAIN SIZE DISTRIBUTION CURVE



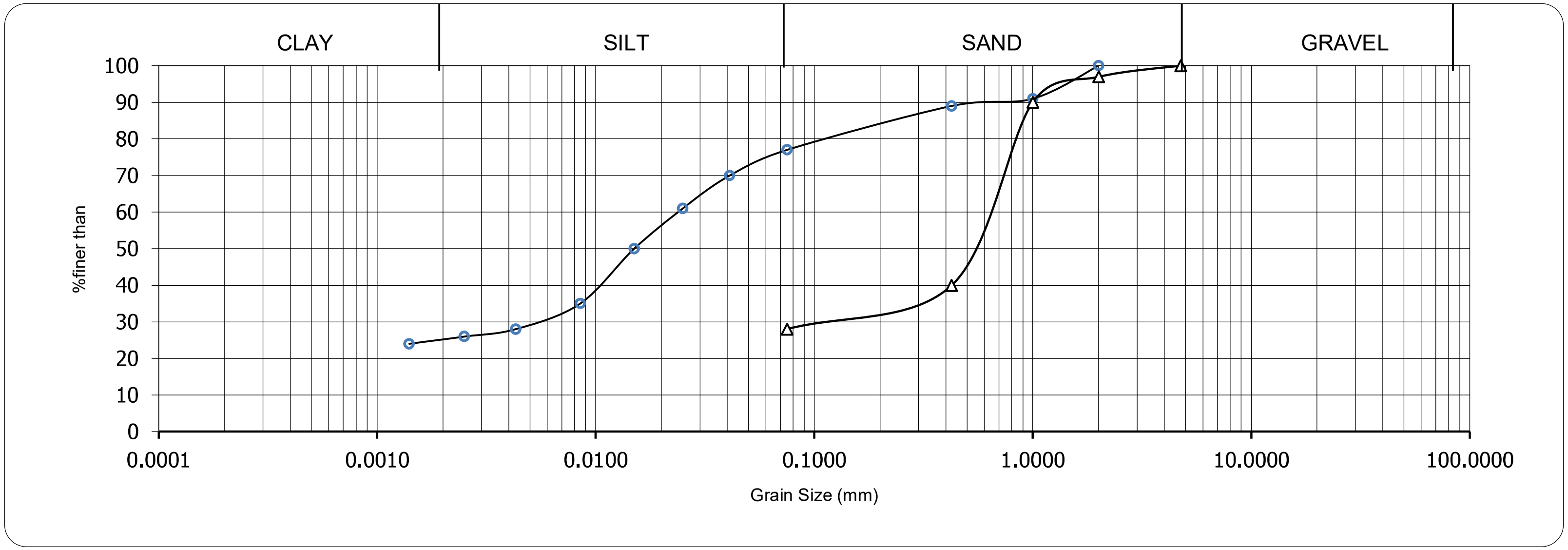
Symbol	BH NO	Depth (m)
○	GT 61	1.50-1.95
△	GT 61	6.0-6.45

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

GRAIN SIZE DISTRIBUTION CURVE



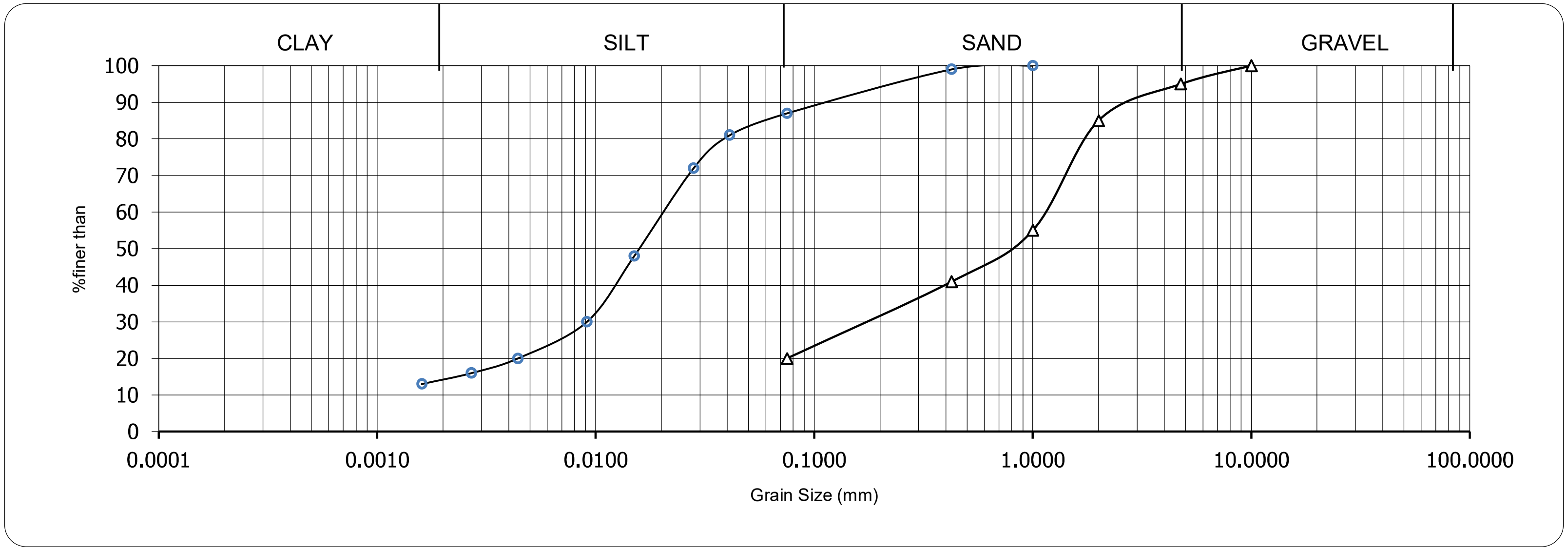
Symbol	BH NO	Depth (m)
○	GT 62	3.0-3.45
△	GT 62	7.50-7.95

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

GRAIN SIZE DISTRIBUTION CURVE



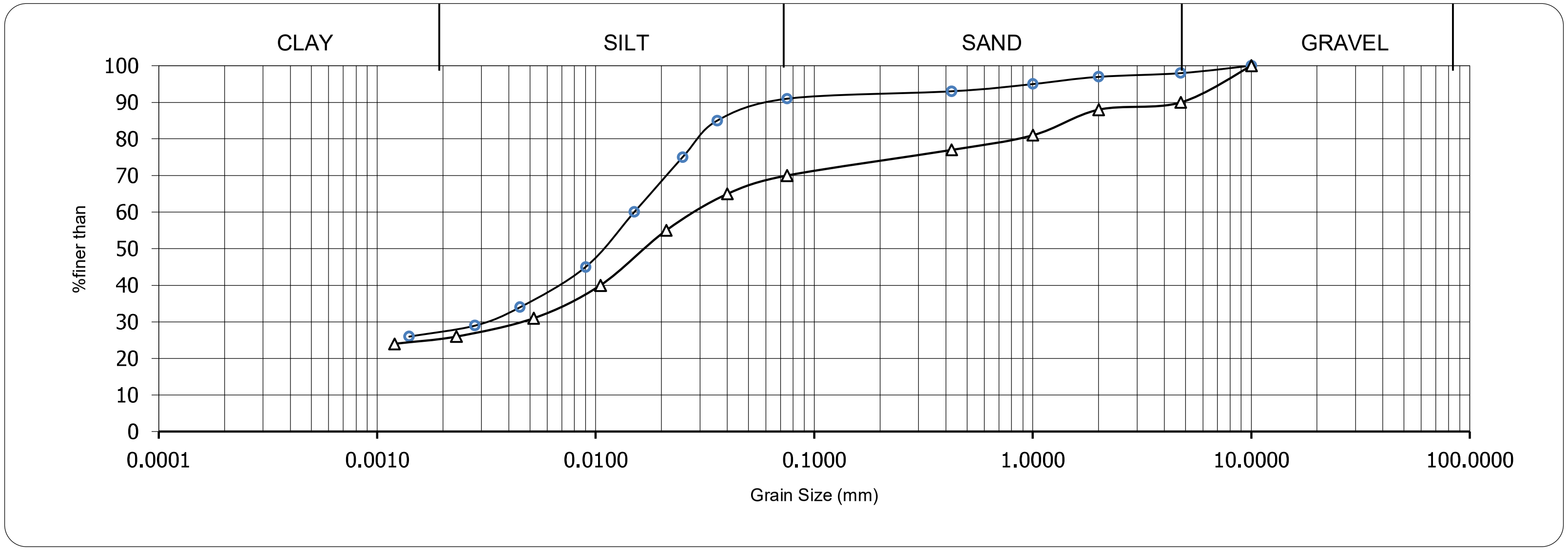
Symbol	BH NO	Depth (m)
○	GT 63	3.0-3.45
△	GT 63	7.50-7.95

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

GRAIN SIZE DISTRIBUTION CURVE



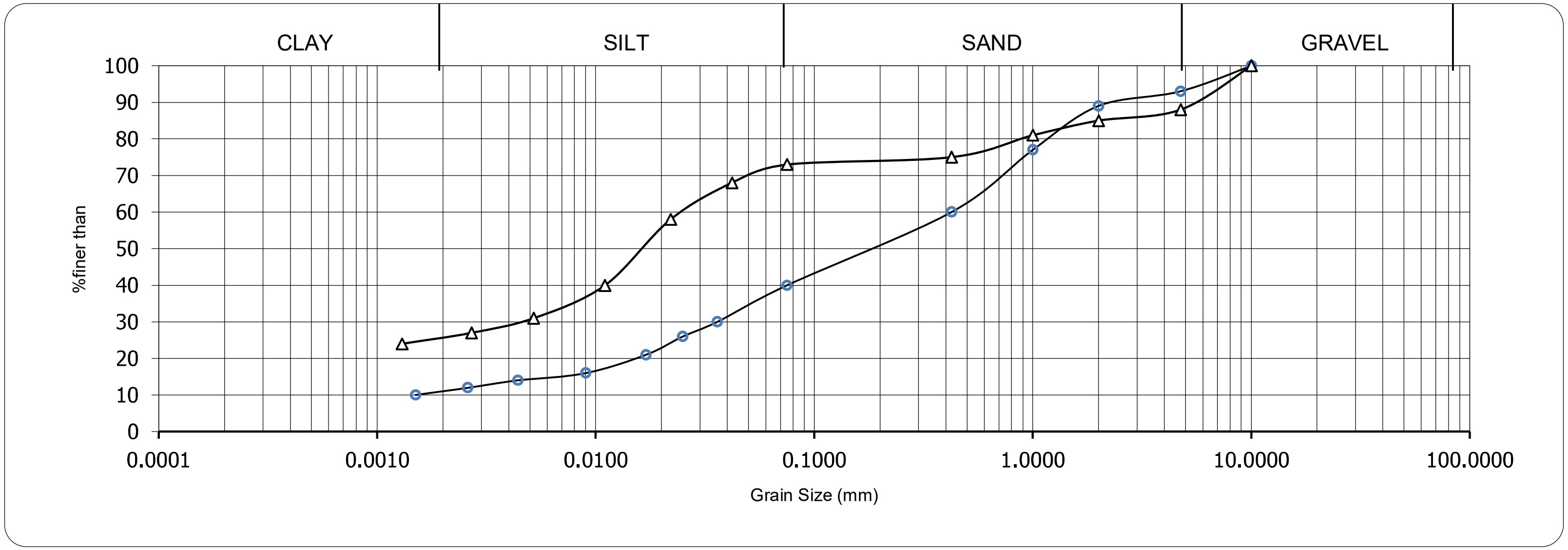
Symbol	BH NO	Depth (m)
○	GT 64	1.50-1.95
△	GT 64	4.50-4.95

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

GRAIN SIZE DISTRIBUTION CURVE



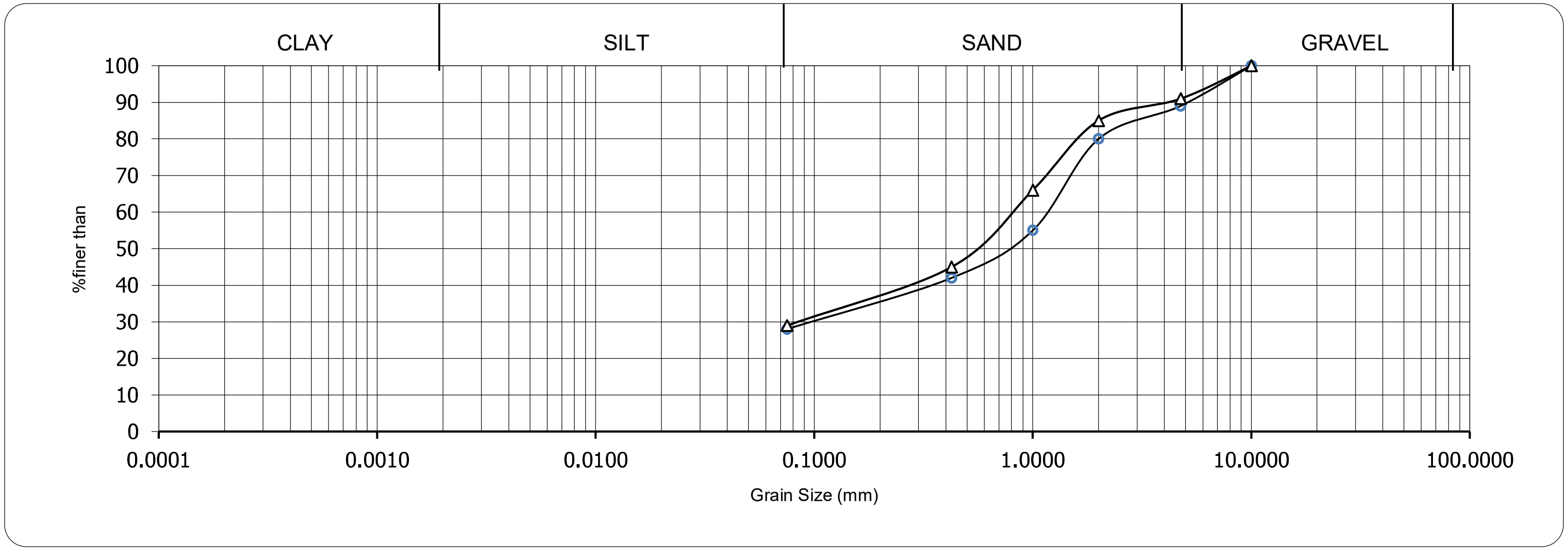
Symbol	BH NO	Depth (m)
○	GT 65	4.50-4.95
△	GT 65	7.50-7.95

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

GRAIN SIZE DISTRIBUTION CURVE



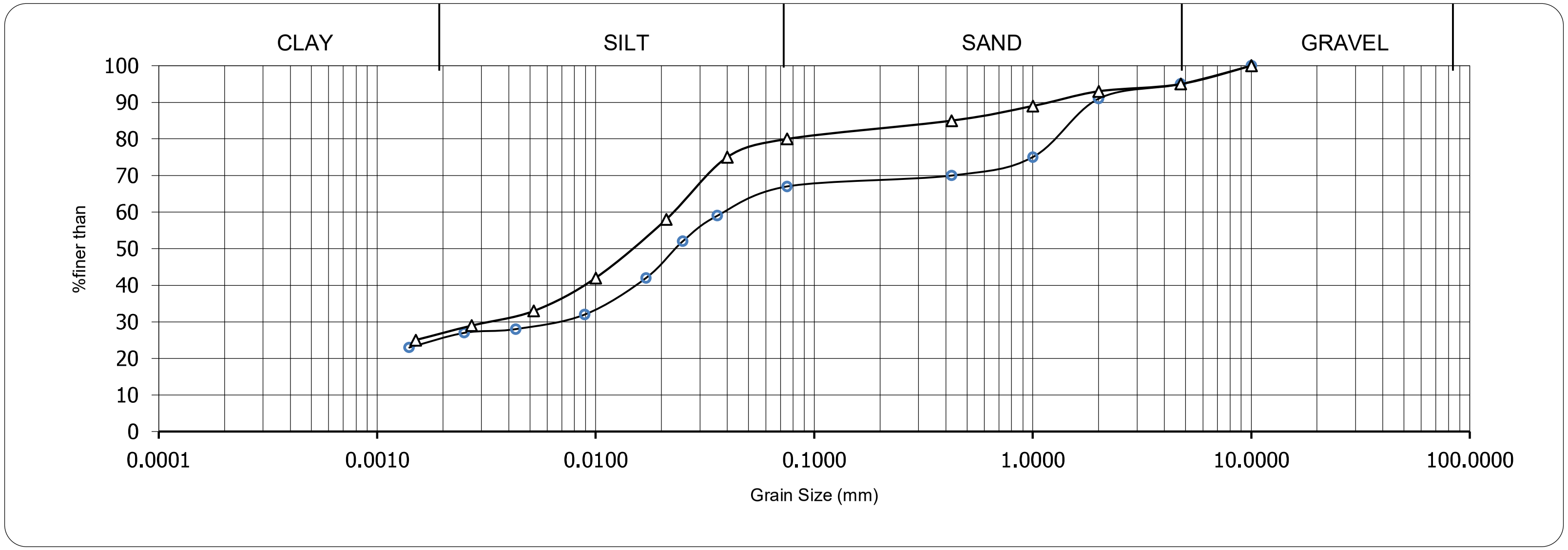
Symbol	BH NO	Depth (m)
○	GT 66	11.0-12.0
△	GT 66	13.0-14.0

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

GRAIN SIZE DISTRIBUTION CURVE



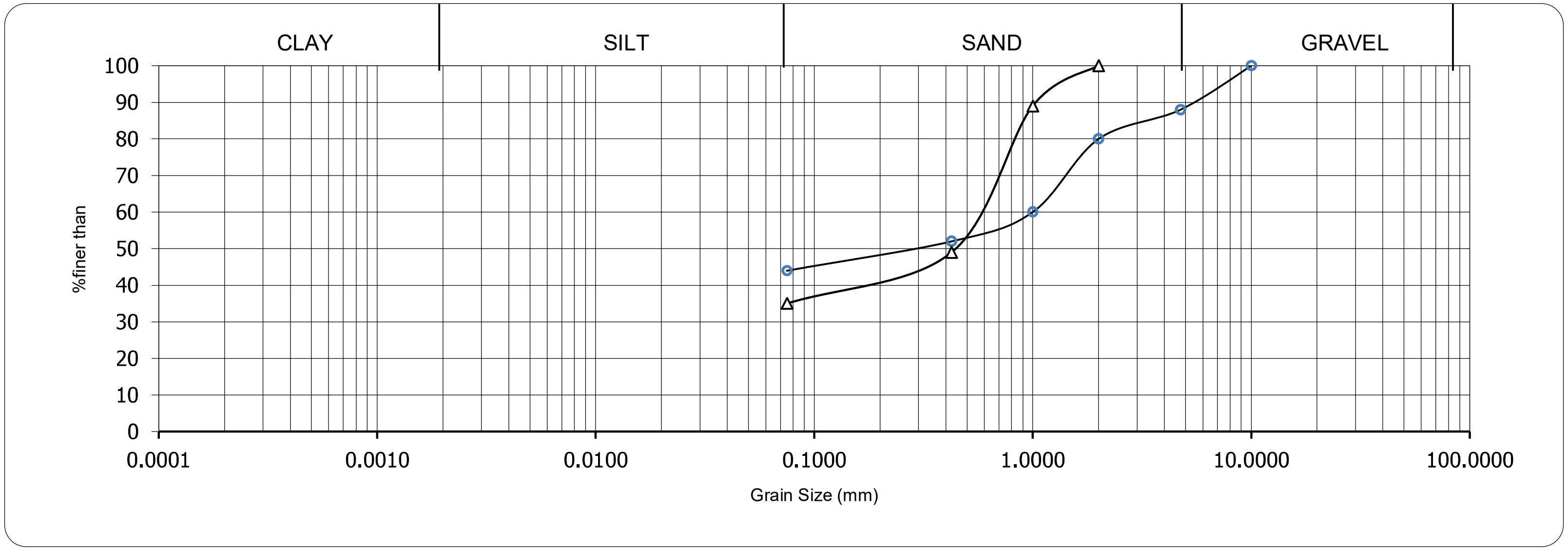
Symbol	BH NO	Depth (m)
○	GT 67	3.0-3.45
△	GT 67	6.0-6.45

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

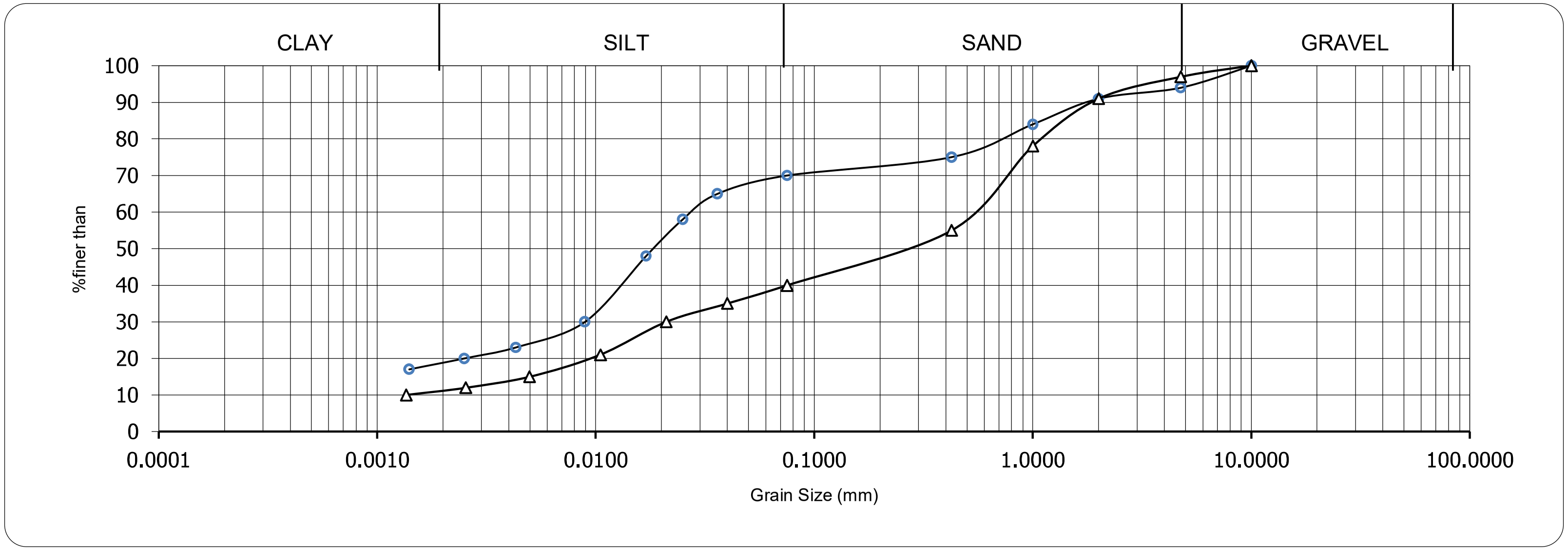
GRAIN SIZE DISTRIBUTION CURVE



Symbol	BH NO	Depth (m)
○	GT 68	1.50-1.95
△	GT 68	3.0-3.45

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

GRAIN SIZE DISTRIBUTION CURVE



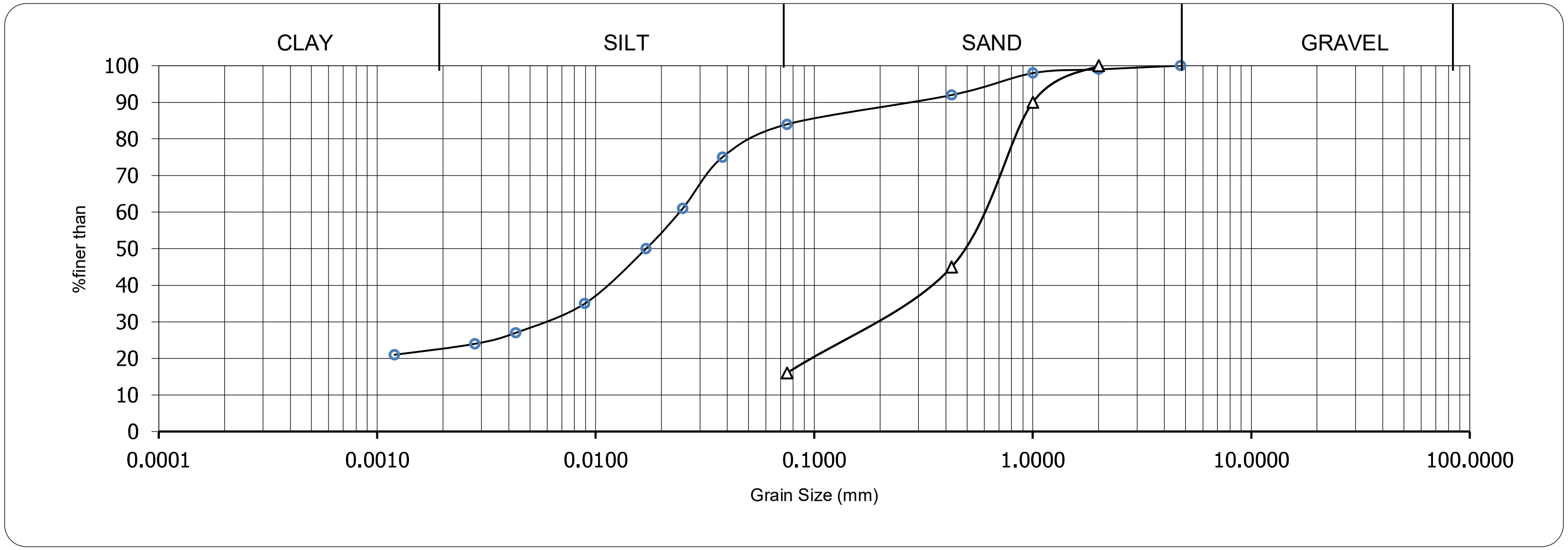
Symbol	BH NO	Depth (m)
○	GT 69A	1.50-1.95
△	GT 69A	6.0-6.45

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

GRAIN SIZE DISTRIBUTION CURVE



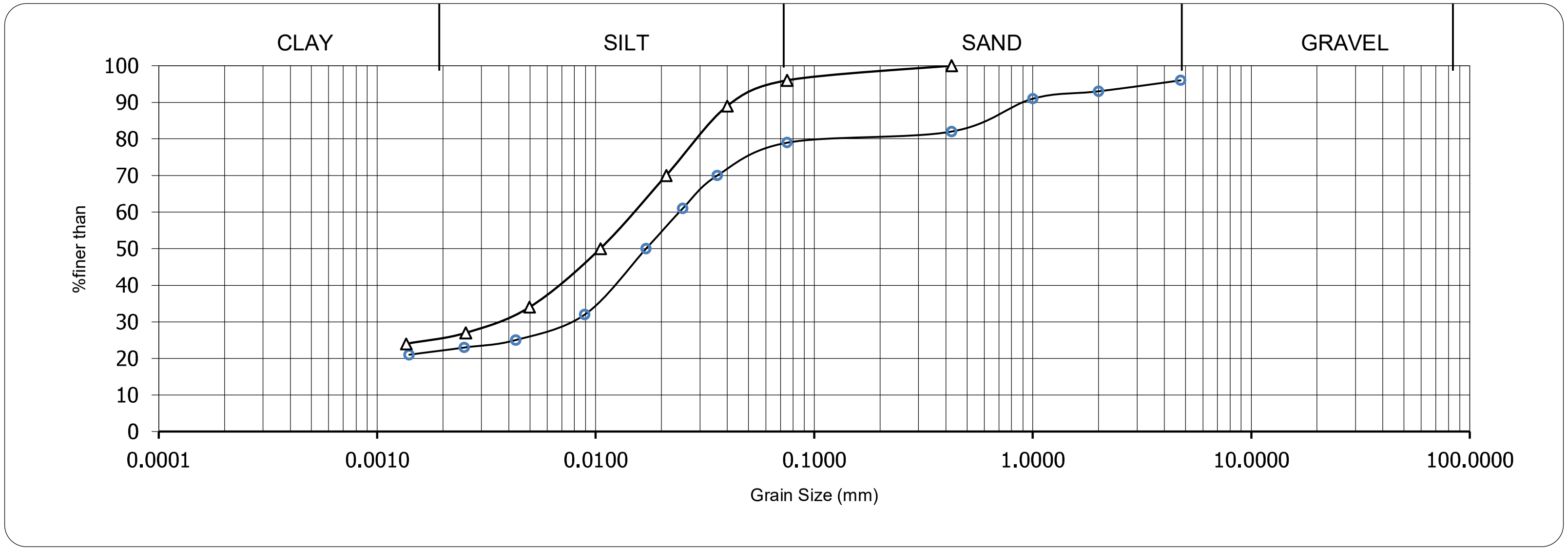
Symbol	BH NO	Depth (m)
○	GT 70	4.50-4.95
△	GT 70	7.50-7.95

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

GRAIN SIZE DISTRIBUTION CURVE



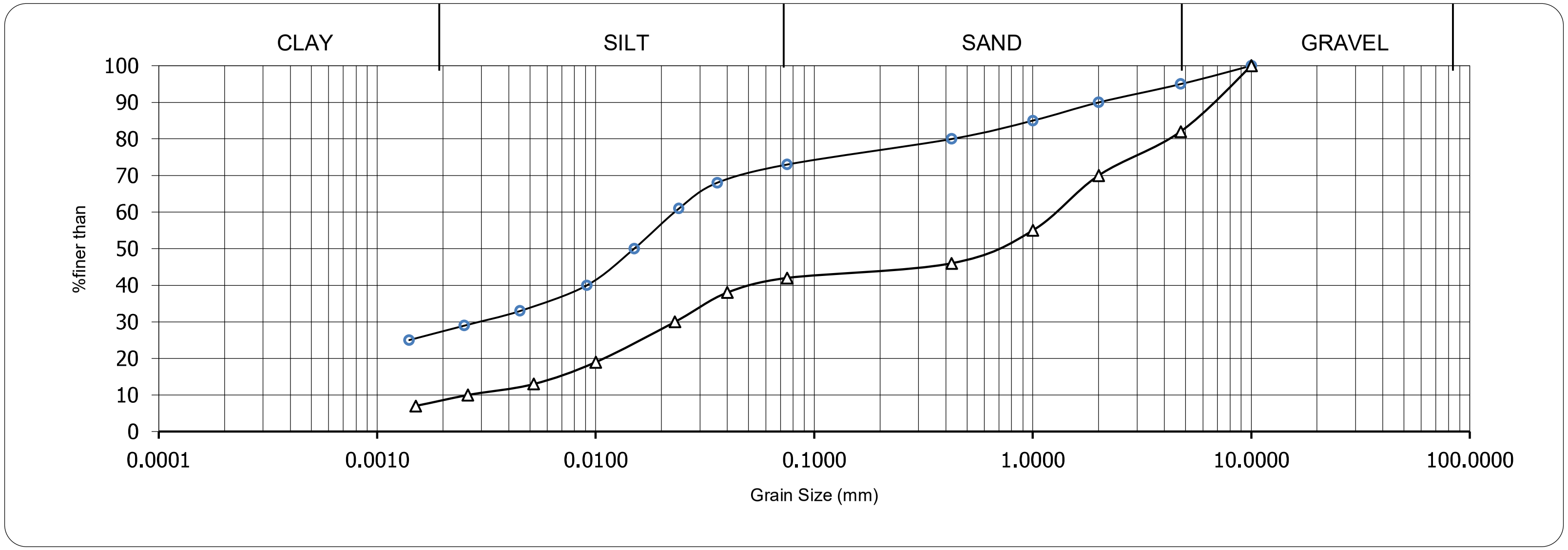
Symbol	BH NO	Depth (m)
○	GT 55A	3.0-3.45
△	GT 71	7.50-7.95

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

GRAIN SIZE DISTRIBUTION CURVE



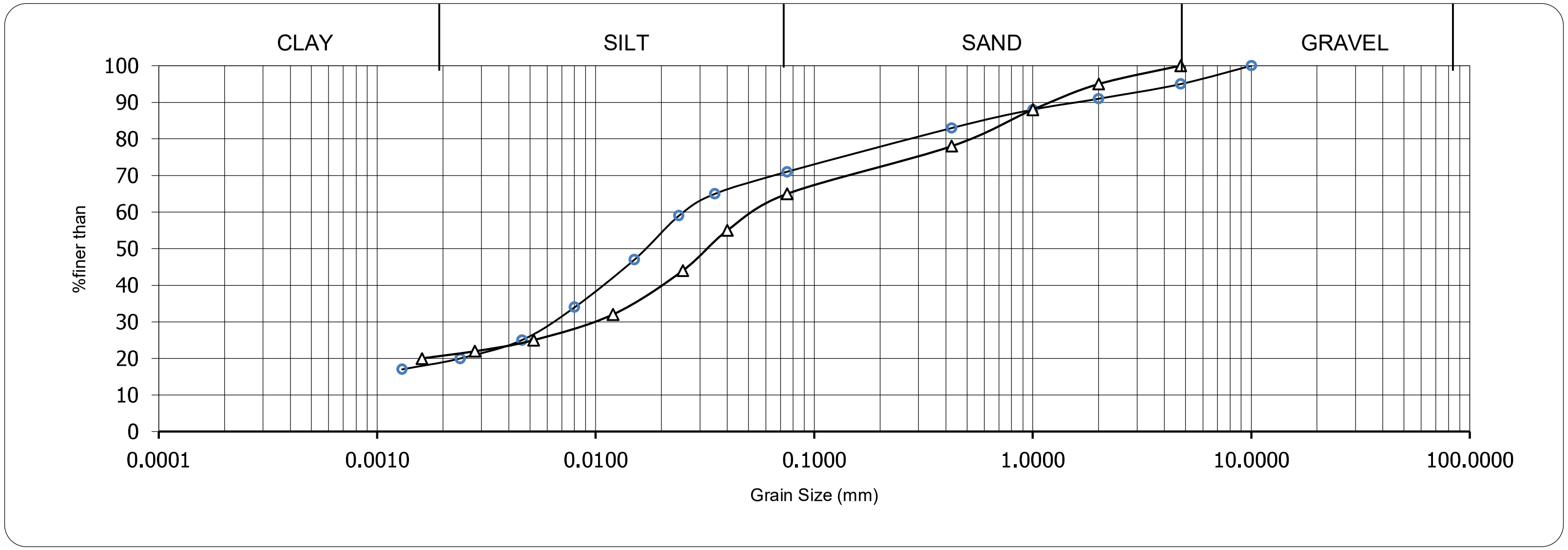
Symbol	BH NO	Depth (m)
○	GT72	3.0-3.45
△	GT 73	4.50-4.95

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

GRAIN SIZE DISTRIBUTION CURVE



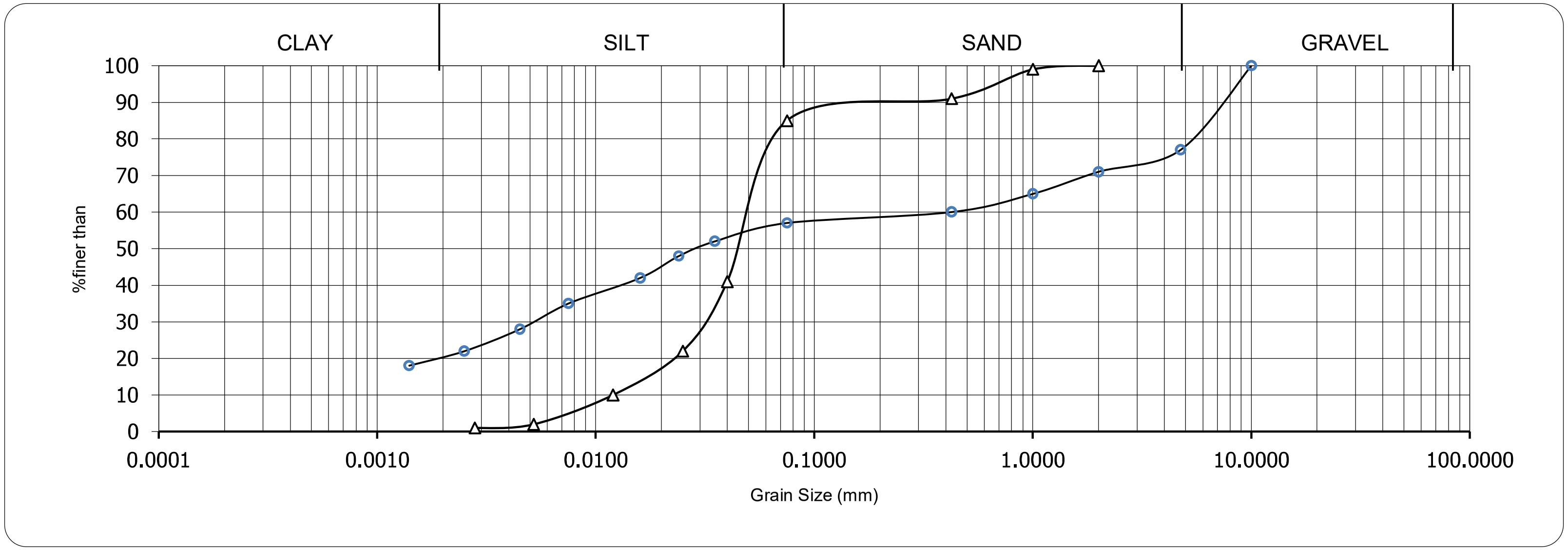
Symbol	BH NO	Depth (m)
○	GT 74	6.0-6.45
△	GT 75A	4.15-4.60

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

GRAIN SIZE DISTRIBUTION CURVE



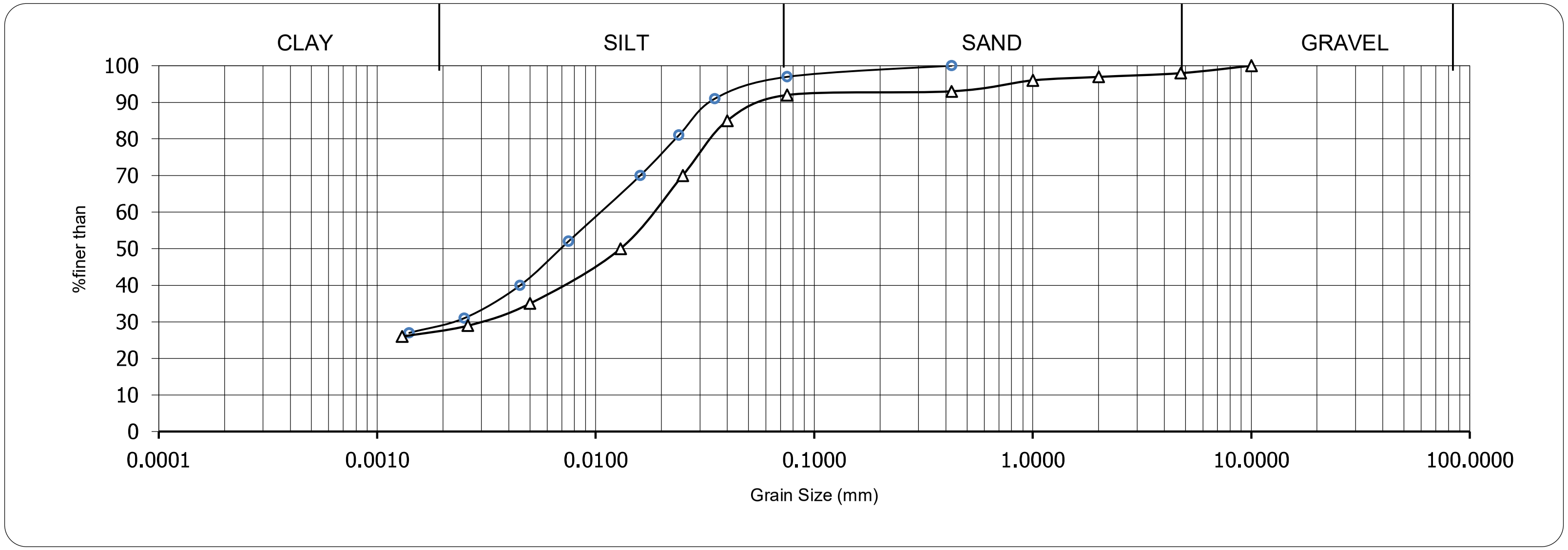
Symbol	BH NO	Depth (m)
○	GT 76	4.50-4.95
△	GT 77	7.50-7.95

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

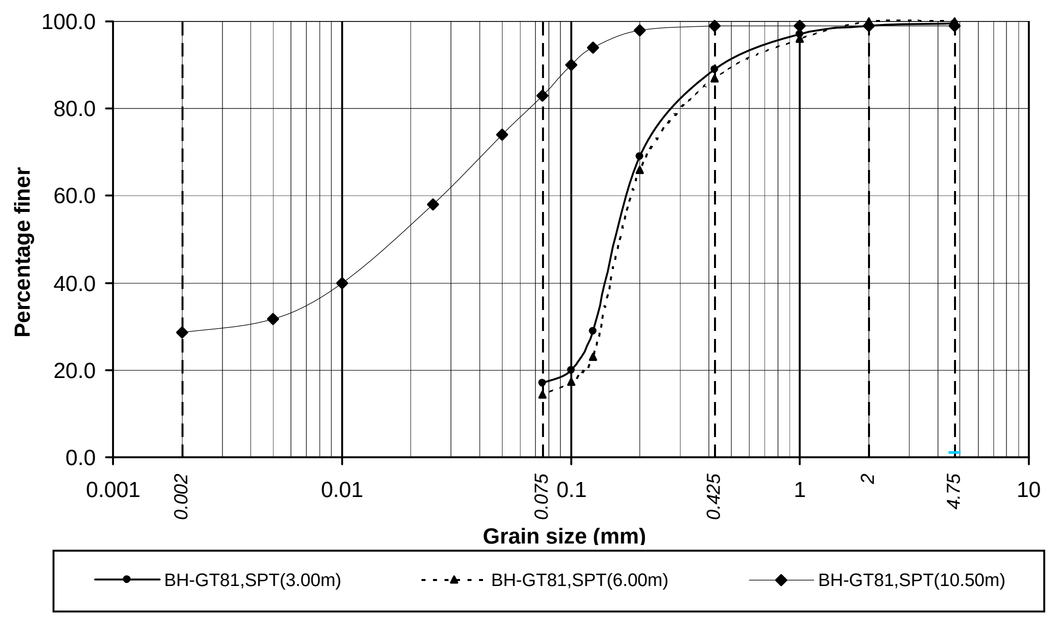
Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

GRAIN SIZE DISTRIBUTION CURVE



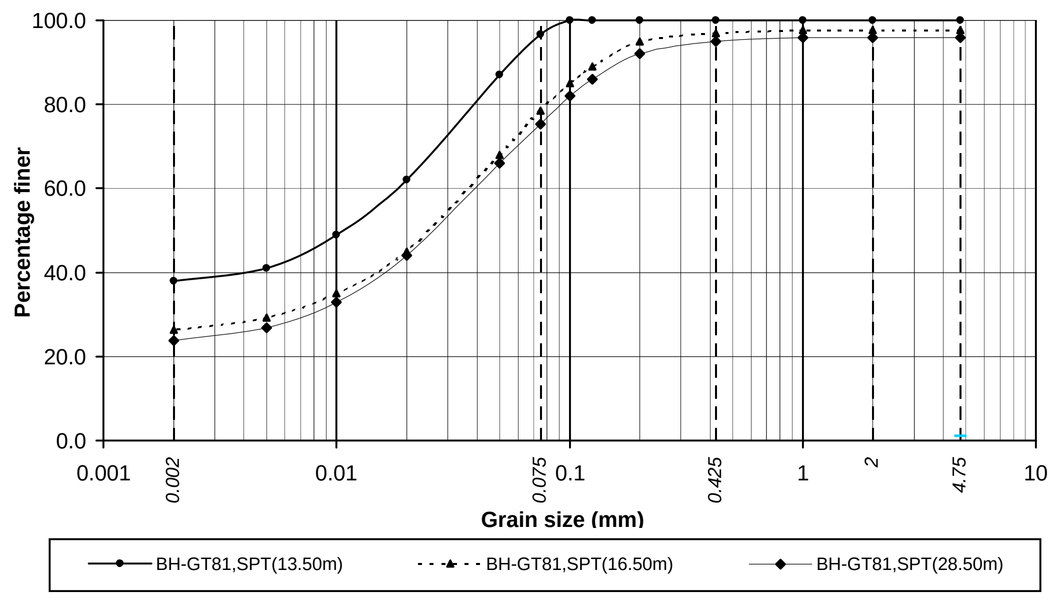
Symbol	BH NO	Depth (m)
○	GT 78	10.50-10.95
△	GT 79	11.0-11.45

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT81,SPT(3.00m)	17.0		83.00	0.0
BH-GT81,SPT(6.00m)	14.4		85.60	0.0
BH-GT81,SPT(10.50m)	28.7	54.2	16.10	1.0

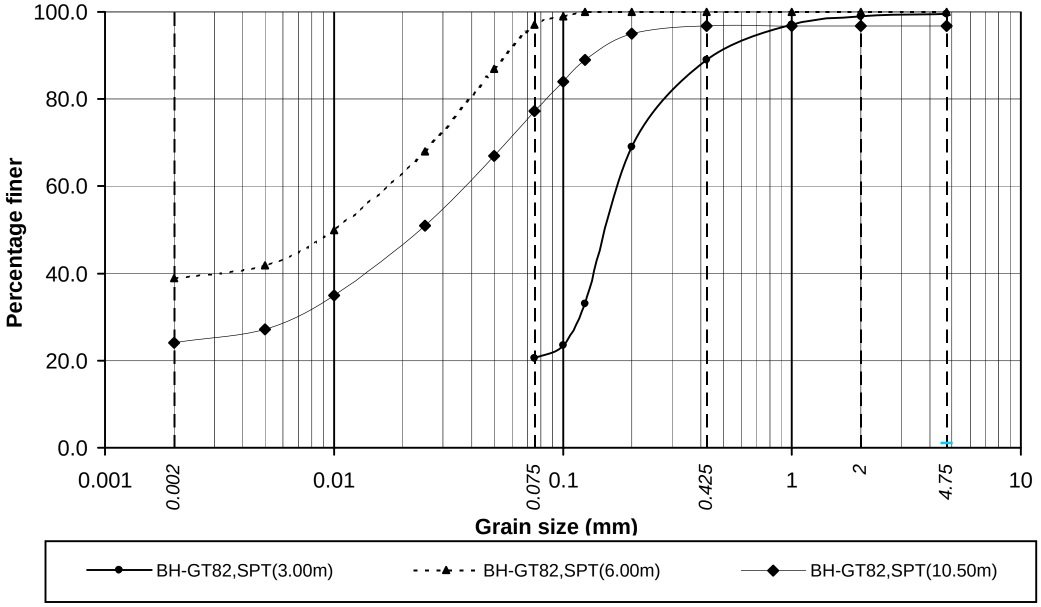
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT81,SPT(13.50m)	38.0	58.6	3.40	0.0
BH-GT81,SPT(16.50m)	26.3	52.2	19.20	2.3
BH-GT81,SPT(28.50m)	23.8	51.5	20.60	4.1

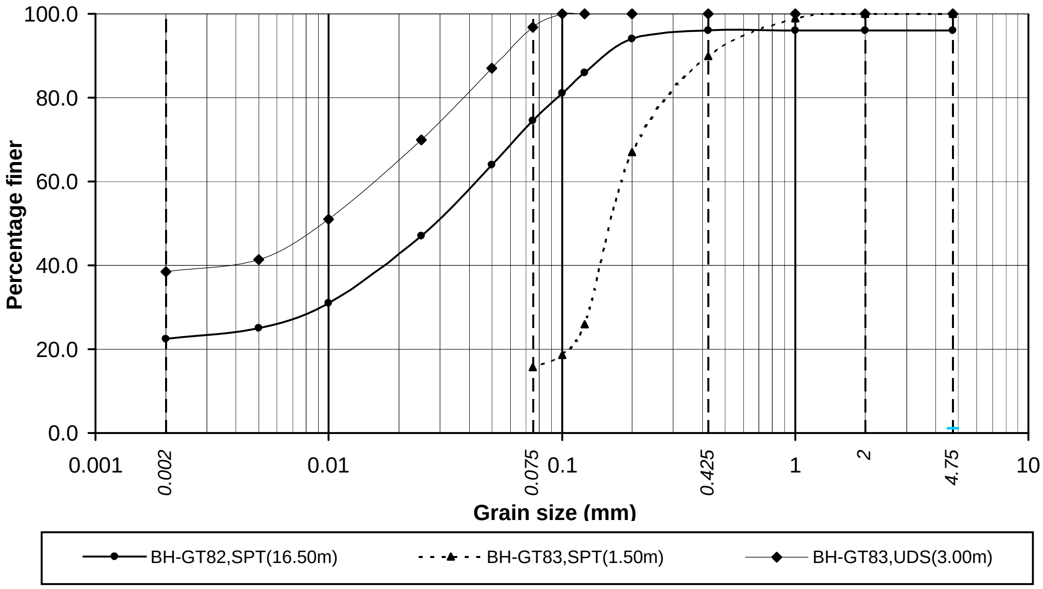
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT82,SPT(3.00m)	20.5		79.50	0.0
BH-GT82,SPT(6.00m)	38.9	58.2	2.90	0.0
BH-GT82,SPT(10.50m)	24.1	53.2	19.40	3.3

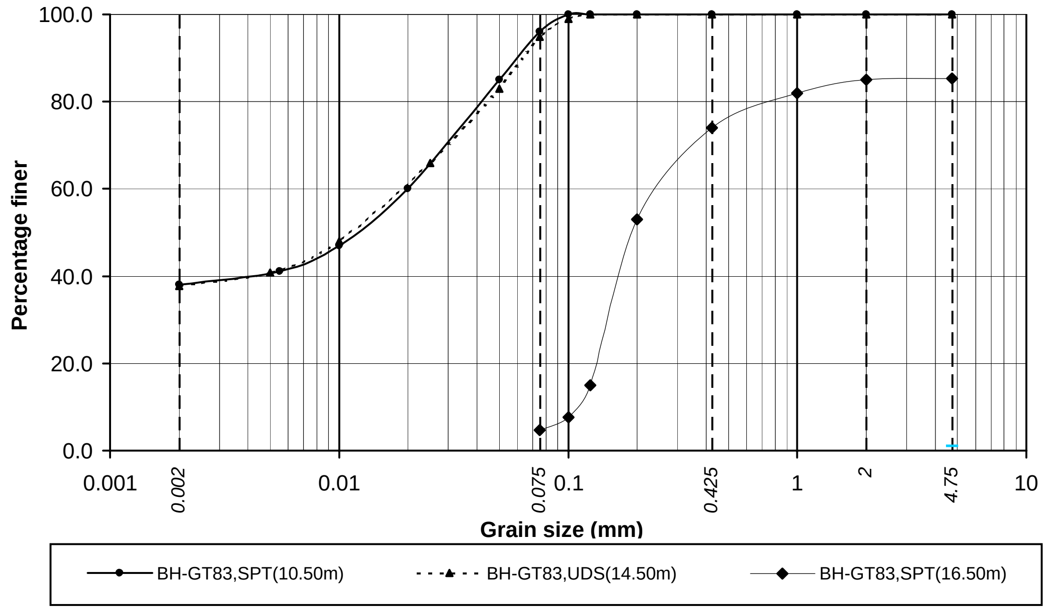
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT82,SPT(16.50m)	22.5	52.0	21.50	4.0
BH-GT83,SPT(1.50m)	15.7		84.30	0.0
BH-GT83,UDS(3.00m)	38.4	58.4	3.20	0.0

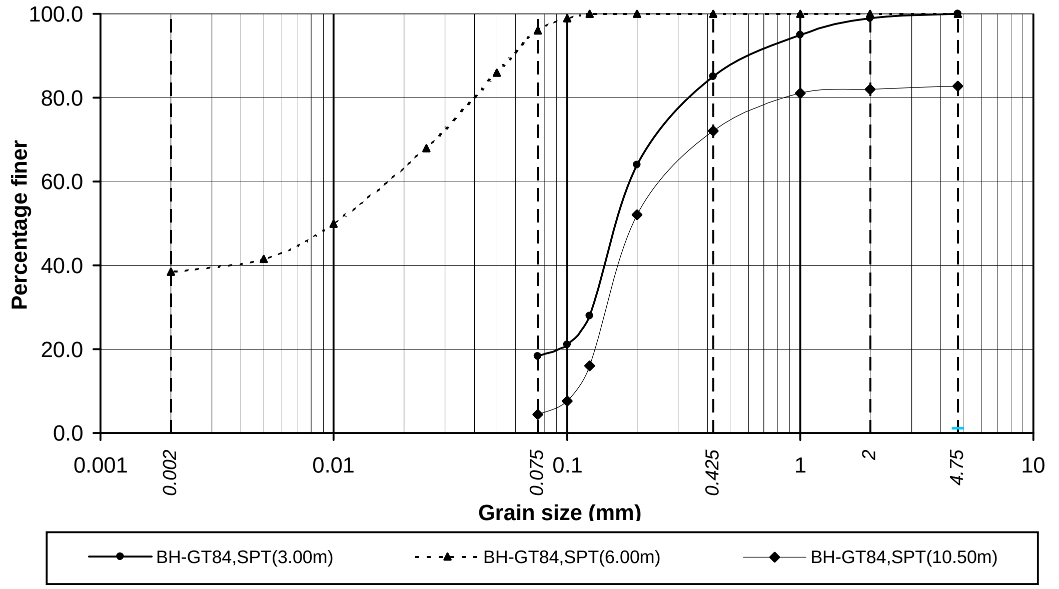
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT83,SPT(10.50m)	38.1	58.0	3.90	0.0
BH-GT83,UDS(14.50m)	37.8	57.1	5.10	0.0
BH-GT83,SPT(16.50m)	4.7		80.60	14.7

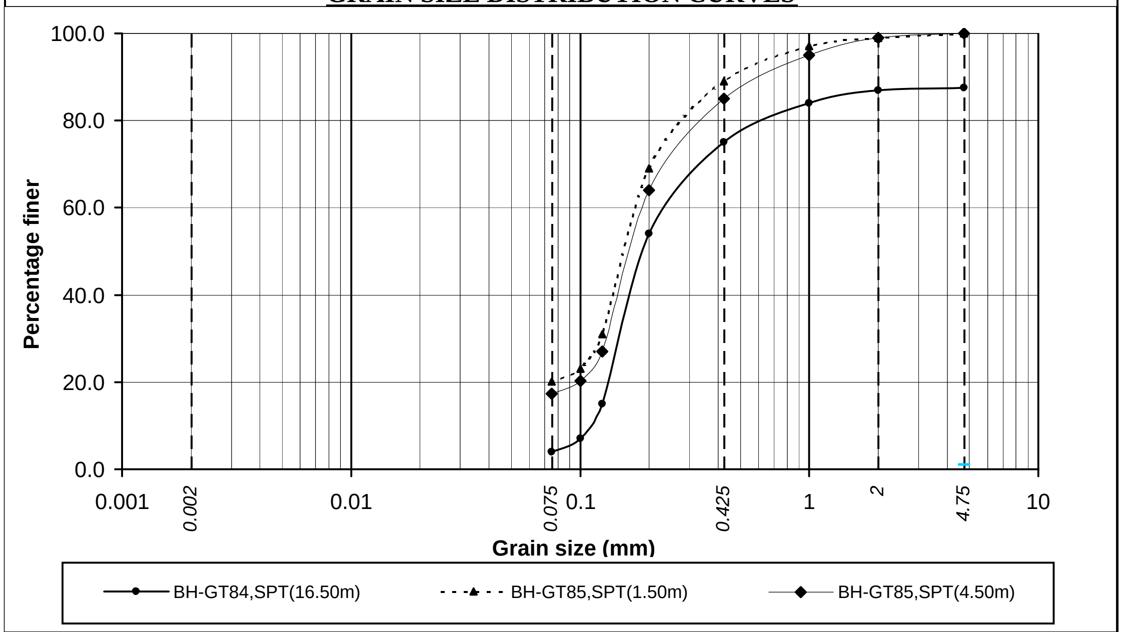
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT84,SPT(3.00m)	18.3		81.70	0.0
BH-GT84,SPT(6.00m)	38.5	57.6	3.90	0.0
BH-GT84,SPT(10.50m)	4.4		78.30	17.3

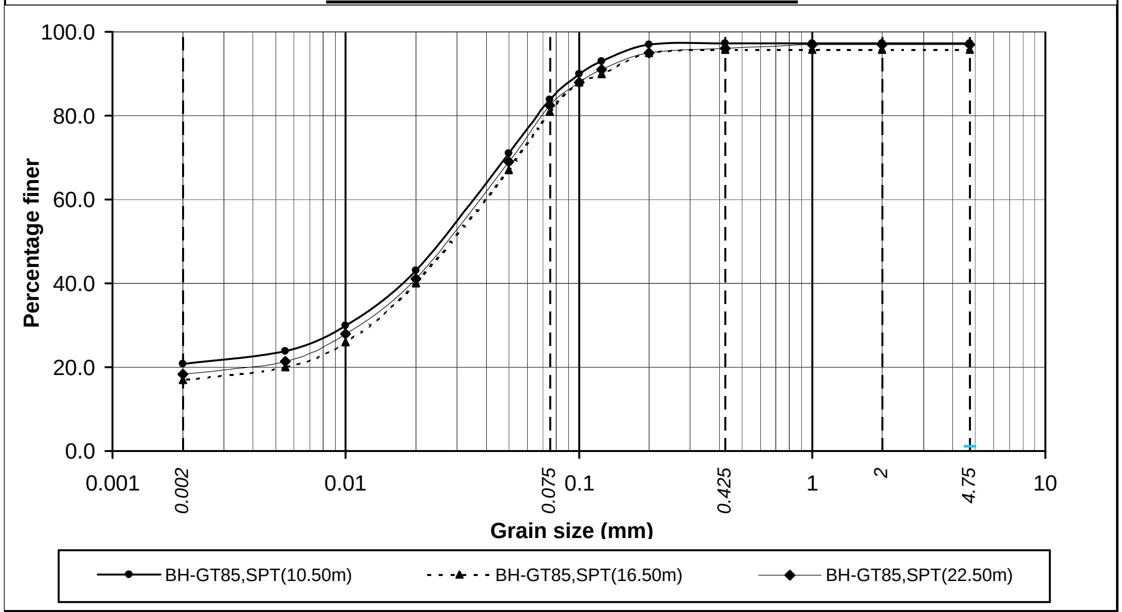
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT84,SPT(16.50m)	4.0		83.50	12.5
BH-GT85,SPT(1.50m)	20.1		79.90	0.0
BH-GT85,SPT(4.50m)	17.3		82.70	0.0

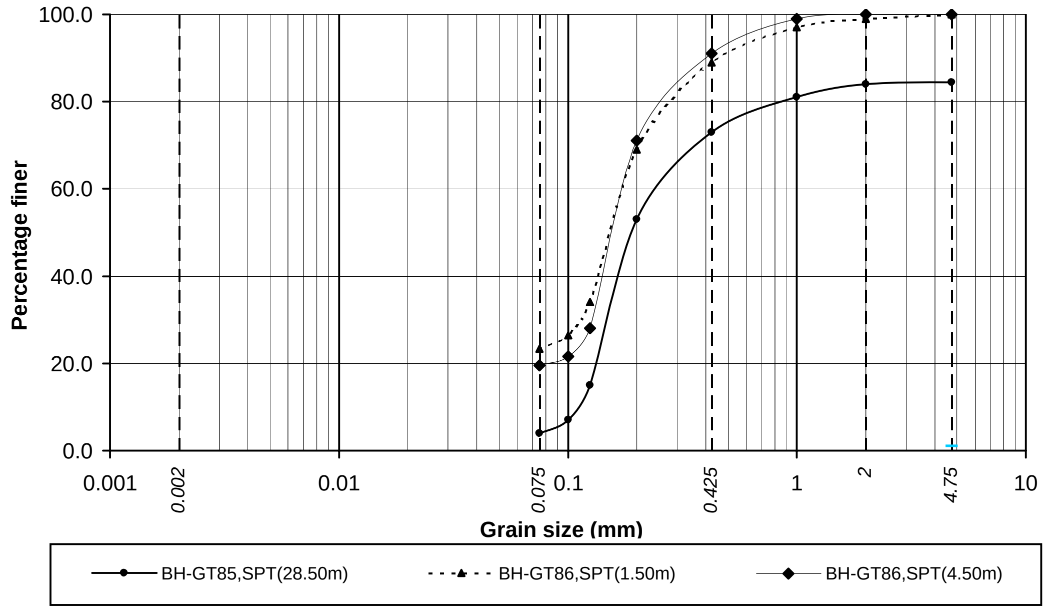
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT85,SPT(10.50m)	20.8	60.3	16.20	2.7
BH-GT85,SPT(16.50m)	17.0	59.6	19.10	4.3
BH-GT85,SPT(22.50m)	18.3	61.0	17.60	3.1

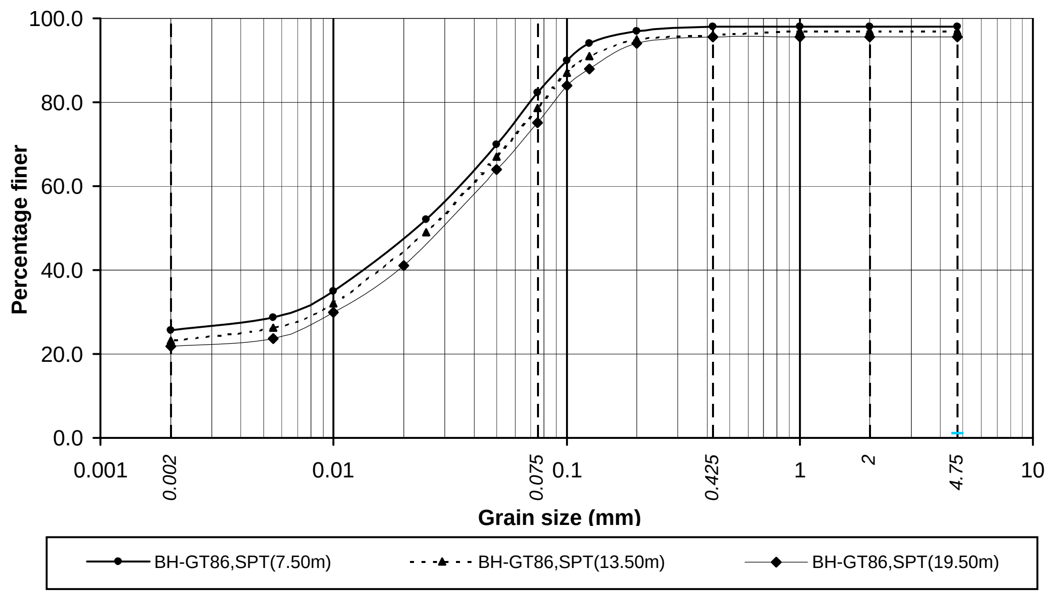
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT85,SPT(28.50m)	4.0		80.40	15.6
BH-GT86,SPT(1.50m)	23.4		76.60	0.0
BH-GT86,SPT(4.50m)	19.6		80.40	0.0

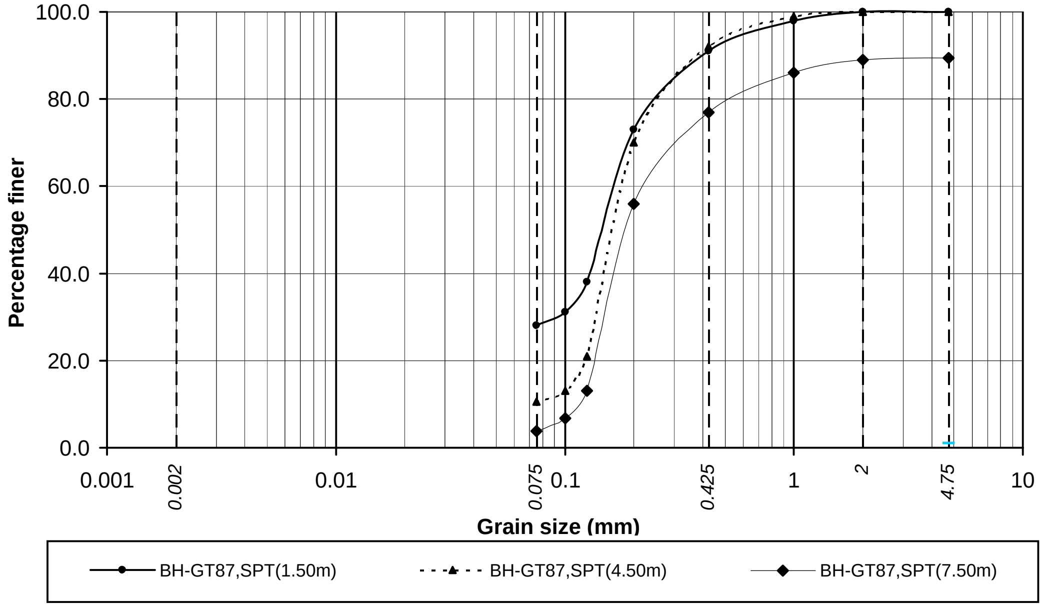
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT86,SPT(7.50m)	25.7	56.6	15.70	2.0
BH-GT86,SPT(13.50m)	23.2	55.5	18.20	3.1
BH-GT86,SPT(19.50m)	21.9	53.2	20.40	4.5

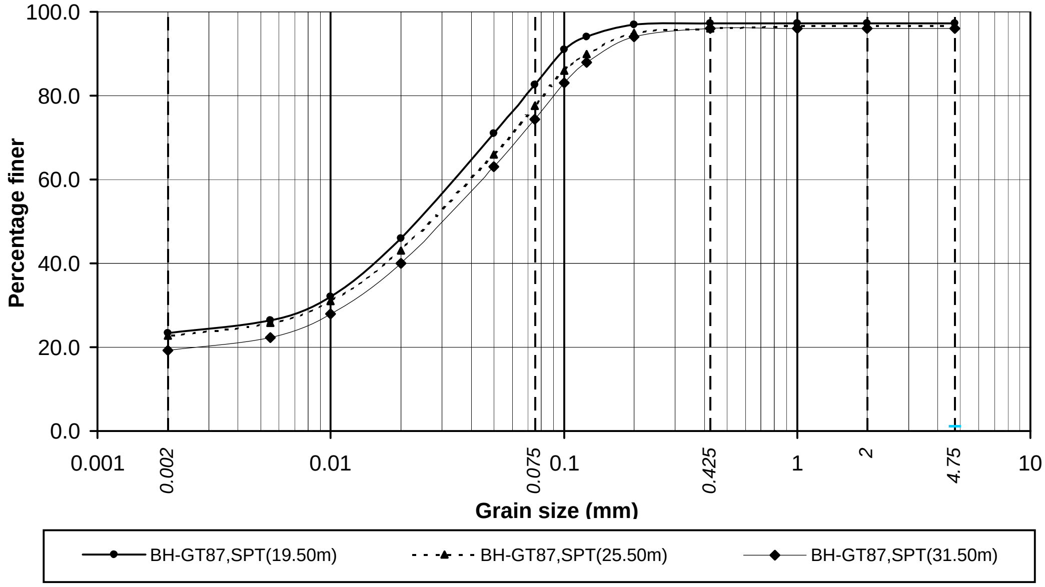
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT87,SPT(1.50m)	28.1		71.90	0.0
BH-GT87,SPT(4.50m)	24.4		75.60	0.0
BH-GT87,SPT(7.50m)	3.8		85.70	10.5

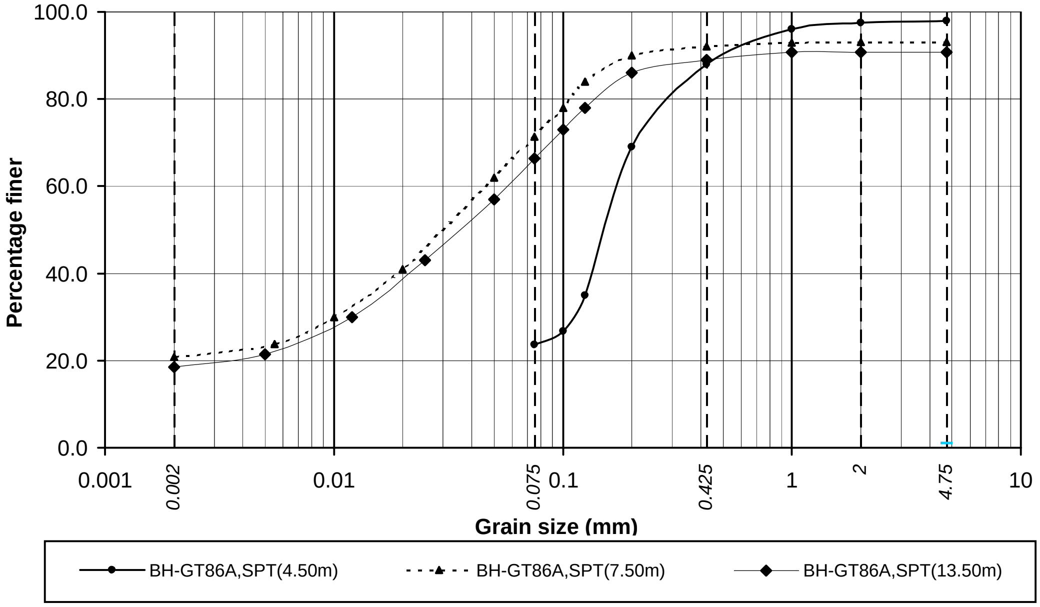
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT87,SPT(19.50m)	23.4	56.5	17.40	2.7
BH-GT87,SPT(25.50m)	22.8	54.8	19.10	3.3
BH-GT87,SPT(31.50m)	19.3	55.1	21.60	4.0

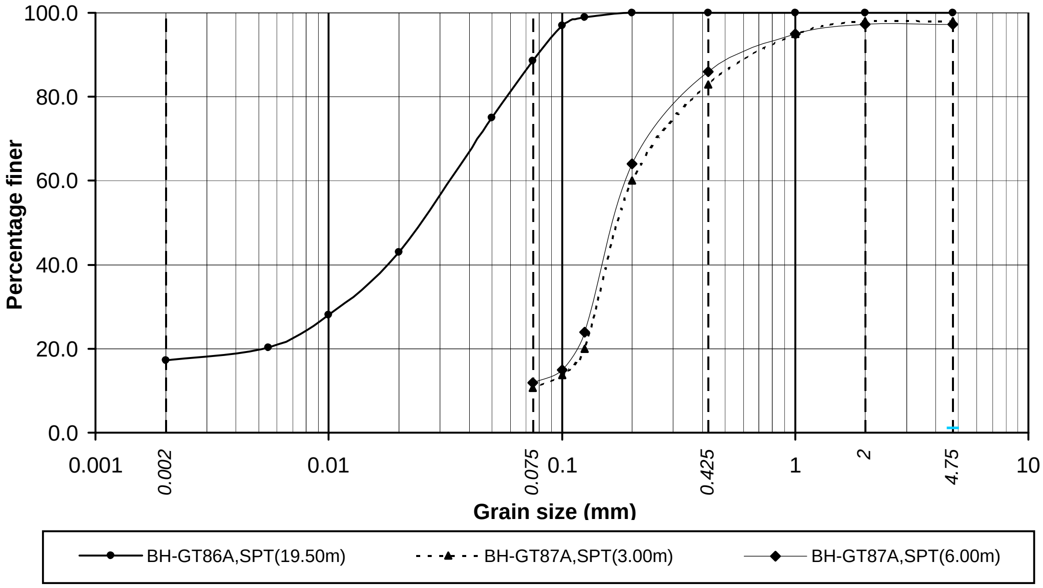
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT86A,SPT(4.50m)	23.7		74.20	2.1
BH-GT86A,SPT(7.50m)	20.8	50.6	21.70	6.9
BH-GT86A,SPT(13.50m)	18.5	47.8	24.50	9.2

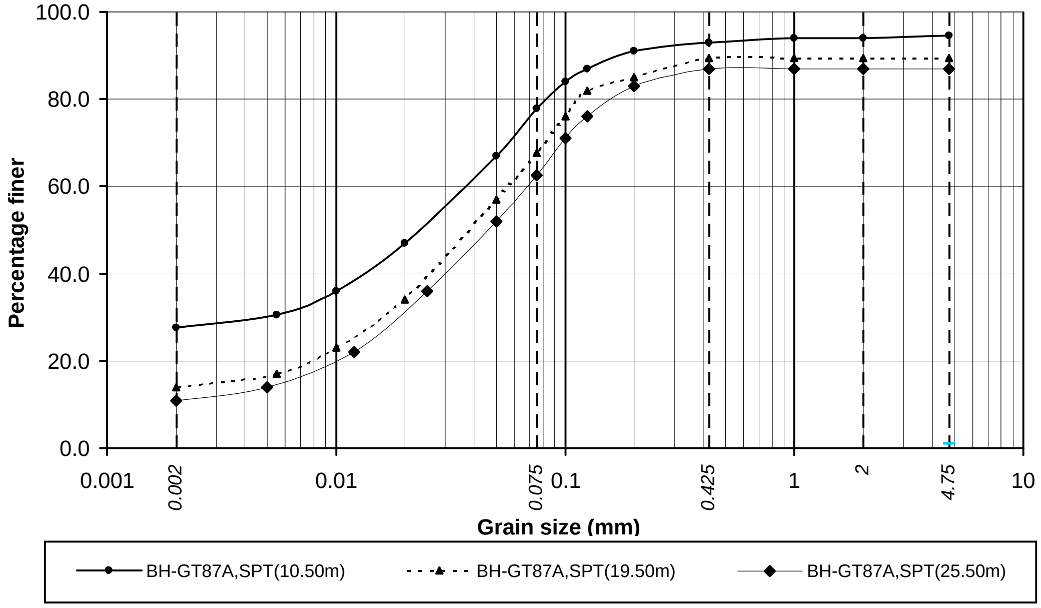
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT86A,SPT(19.50m)	17.2	44.5	26.80	11.5
BH-GT87A,SPT(3.00m)	10.7		87.30	2.0
BH-GT87A,SPT(6.00m)	11.9		85.40	2.7

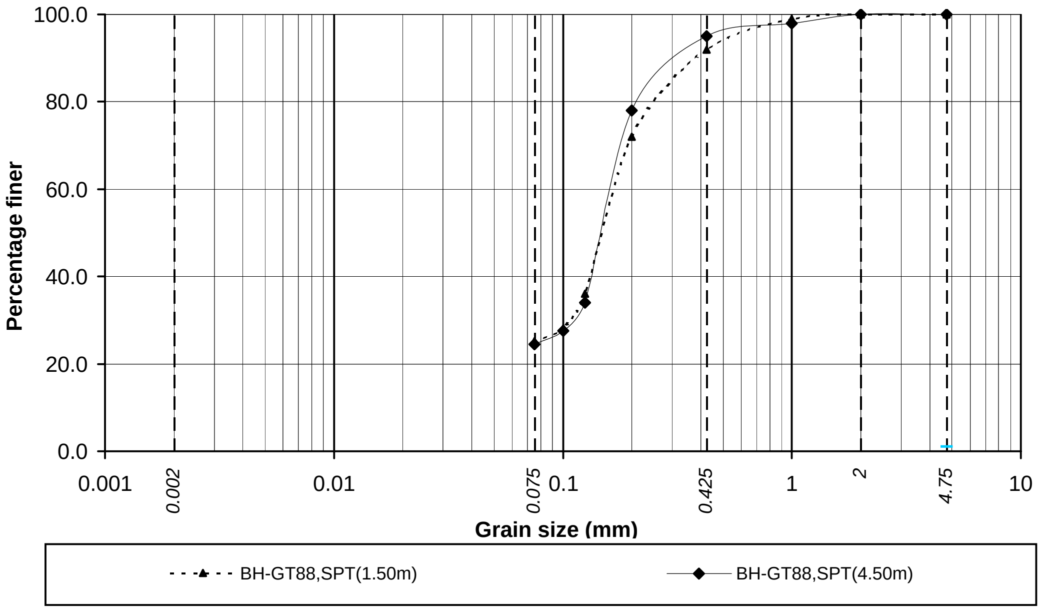
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



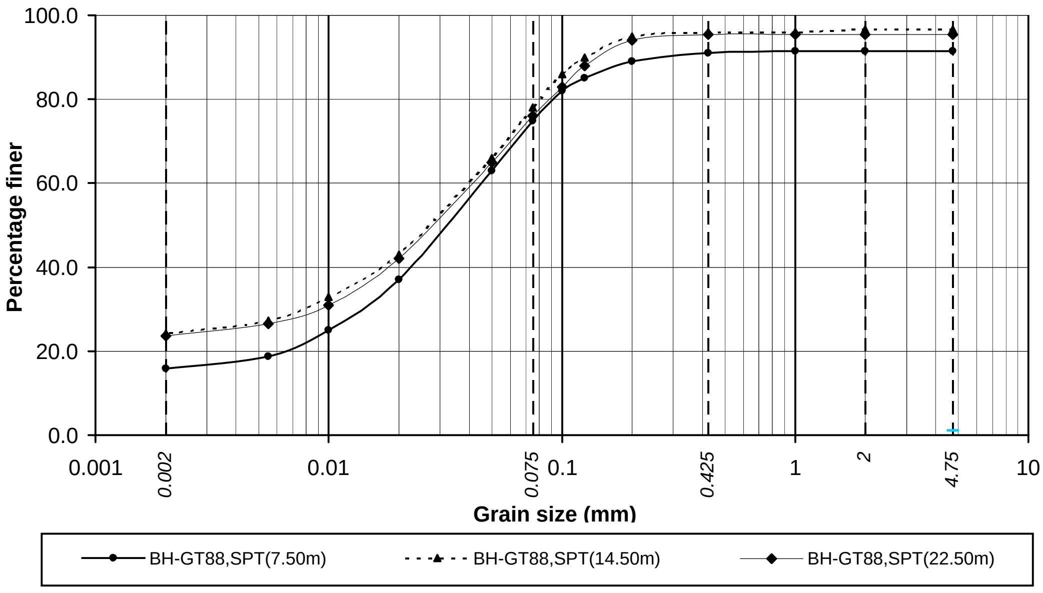
Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT87A,SPT(10.50m)	27.6	50.2	16.80	5.4
BH-GT87A,SPT(19.50m)	14.0	53.7	21.70	10.6
BH-GT87A,SPT(25.50m)	10.9	51.6	24.50	13.0

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT88,SPT(1.50m)	25.2		74.80	0.0
BH-GT88,SPT(4.50m)	24.5		75.50	0.0

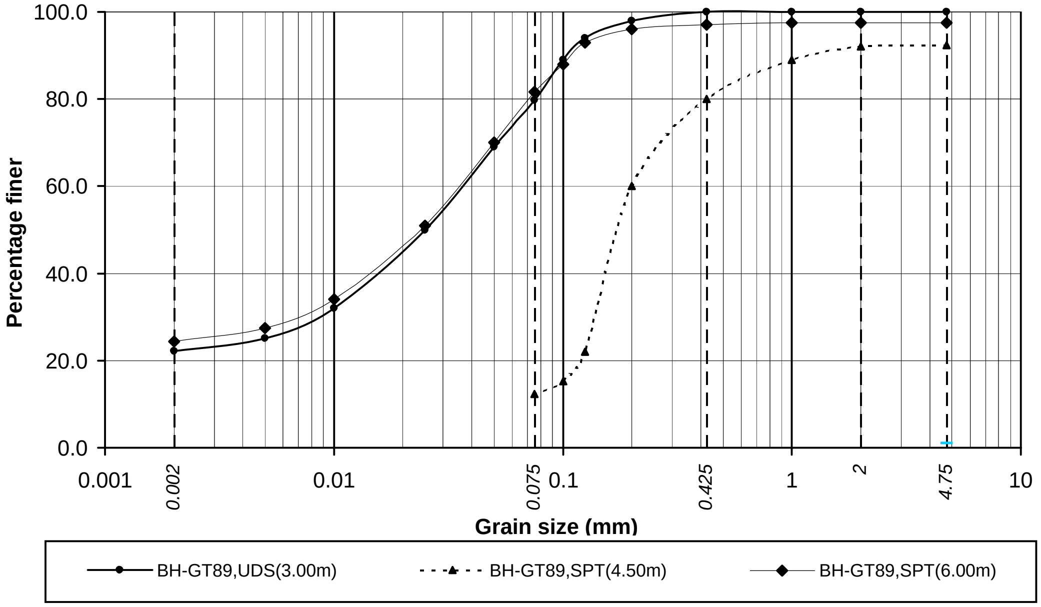
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT88,SPT(7.50m)	15.8	50.6	25.10	8.5
BH-GT88,SPT(14.50m)	24.3	53.7	18.60	3.4
BH-GT88,SPT(22.50m)	23.6	52.5	19.30	4.6

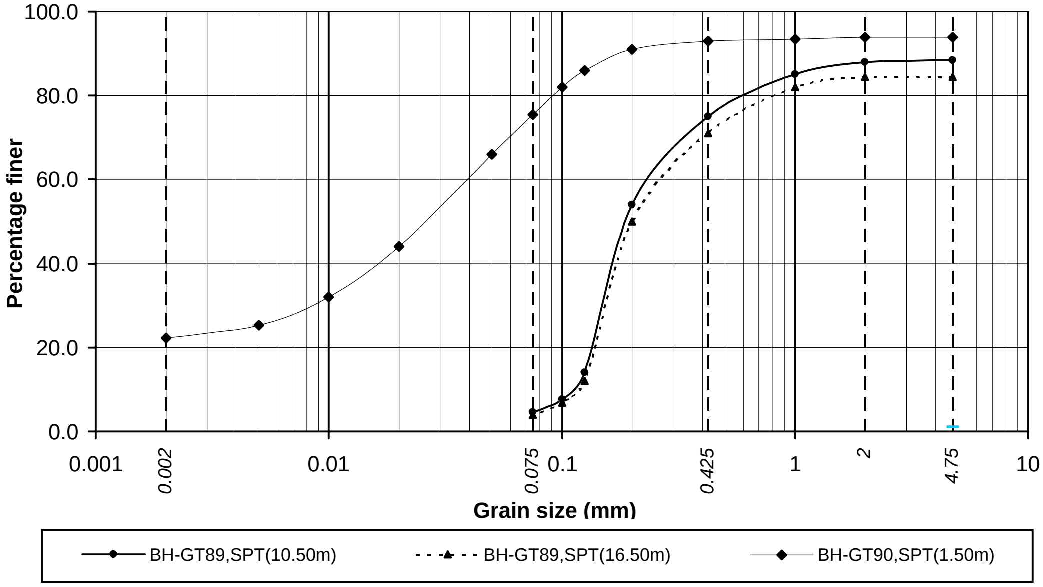
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT89,UDS(3.00m)	22.1	57.6	20.30	0.0
BH-GT89,SPT(4.50m)	12.3		80.10	7.6
BH-GT89,SPT(6.00m)	24.4	57.2	15.90	2.5

GRAIN SIZE DISTRIBUTION CURVES

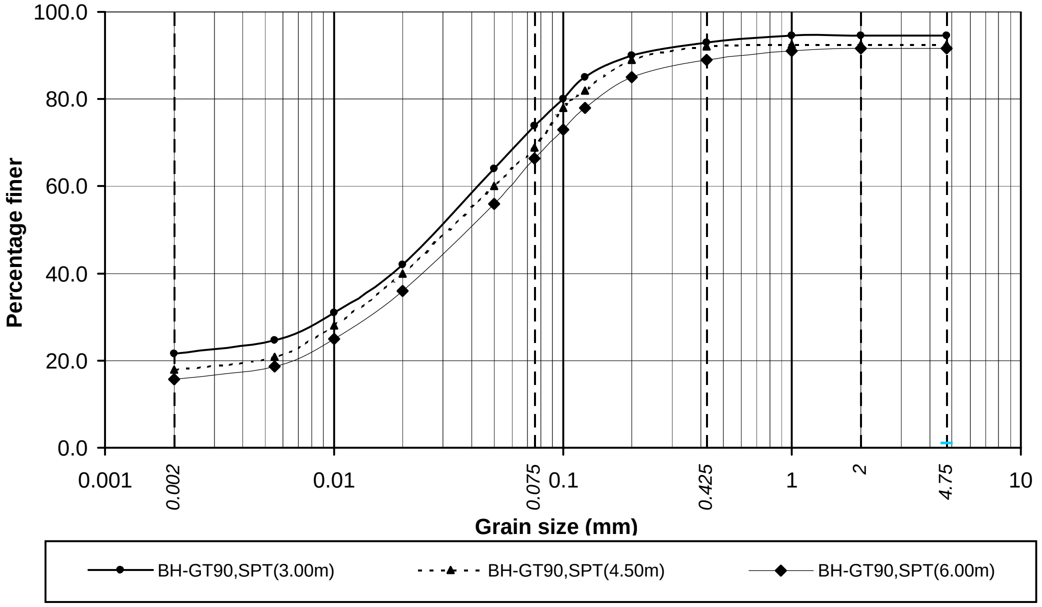


Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT89,SPT(10.50m)	4.6		83.80	11.6
BH-GT89,SPT(16.50m)	3.9		80.60	15.5
BH-GT90,SPT(1.50m)	22.3	53.1	18.50	6.1

*Silt & Clay

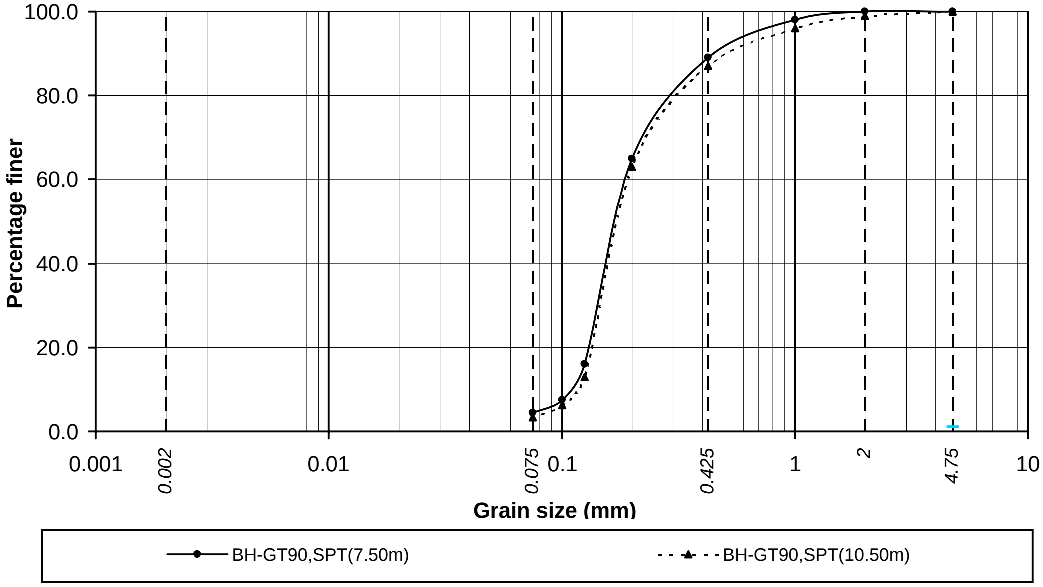
Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT90,SPT(3.00m)	21.6	52.2	20.80	5.4
BH-GT90,SPT(4.50m)	17.9	51.0	23.60	7.5
BH-GT90,SPT(6.00m)	15.7	50.7	25.30	8.3

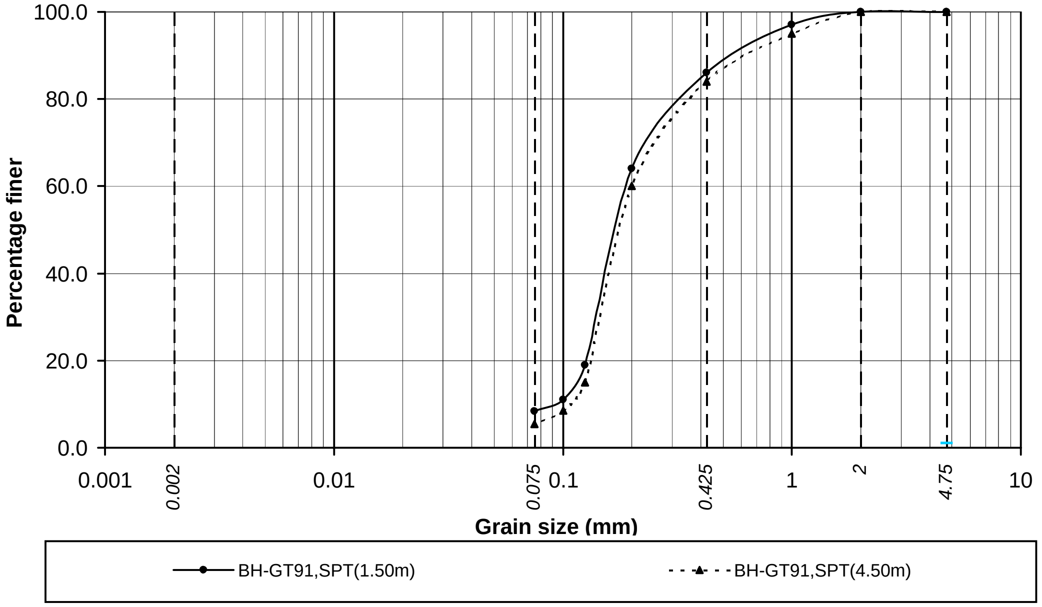
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT90,SPT(7.50m)	4.4		95.60	0.0
BH-GT90,SPT(10.50m)	3.3		96.70	0.0

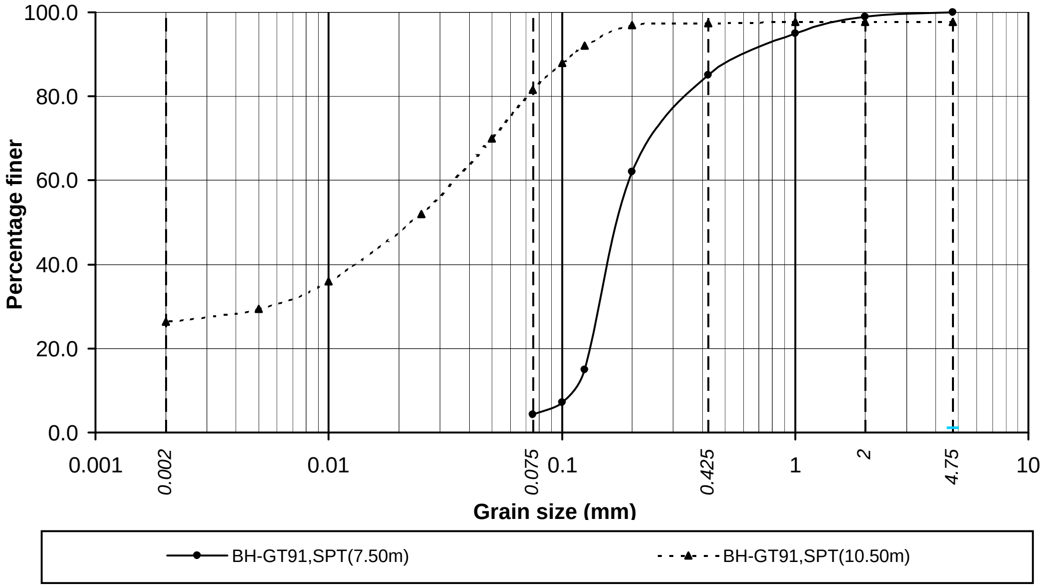
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT91,SPT(1.50m)	8.3		91.70	0.0
BH-GT91,SPT(4.50m)	5.5		94.50	0.0

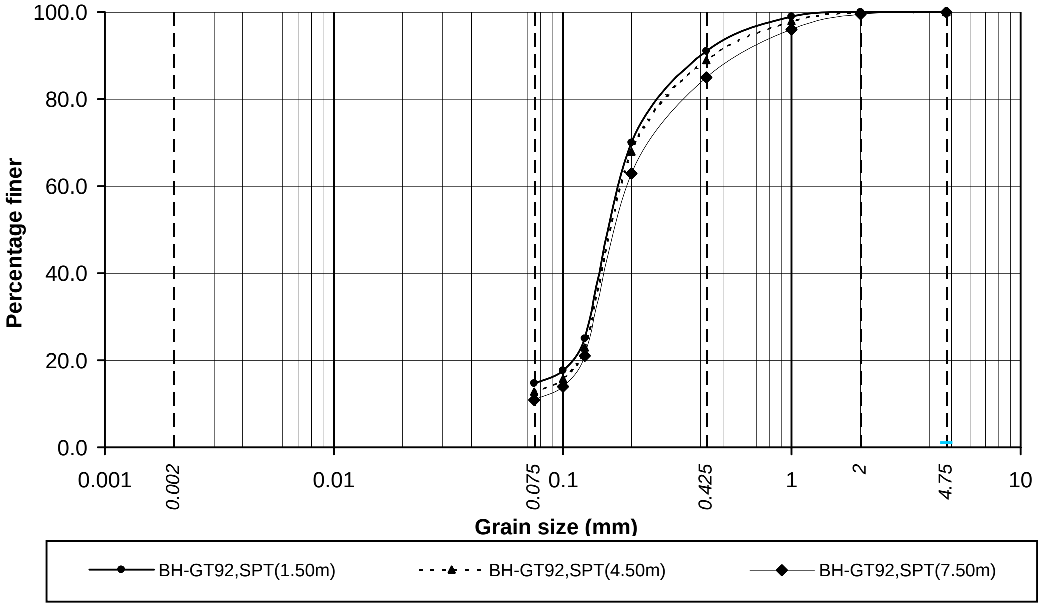
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT91,SPT(7.50m)	4.2		95.80	0.0
BH-GT91,SPT(10.50m)	26.4	55.1	16.20	2.3

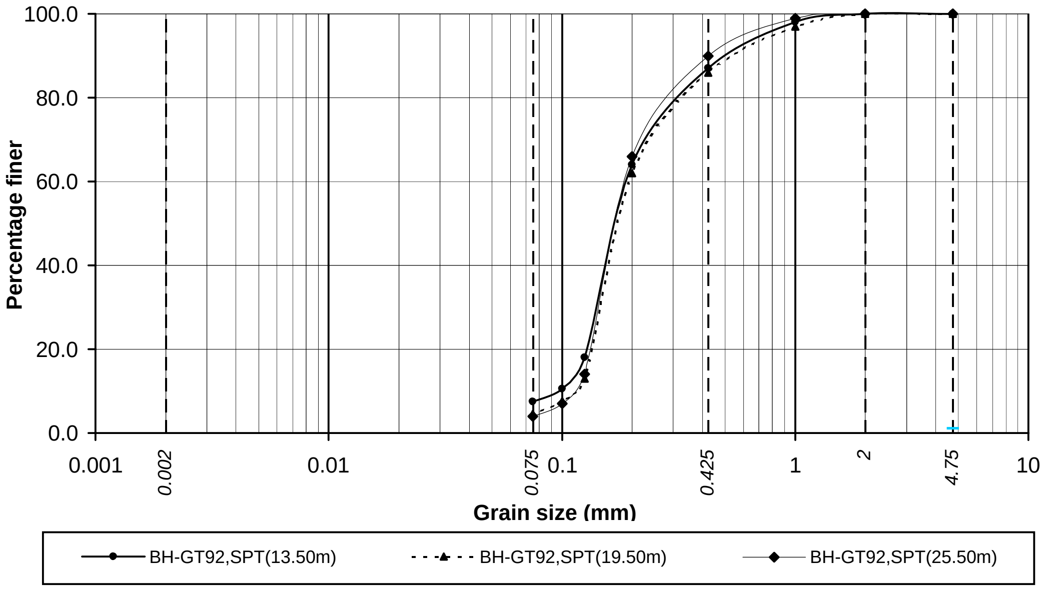
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT92,SPT(1.50m)	14.7		85.30	0.0
BH-GT92,SPT(4.50m)	12.8		87.20	0.0
BH-GT92,SPT(7.50m)	10.9		89.10	0.0

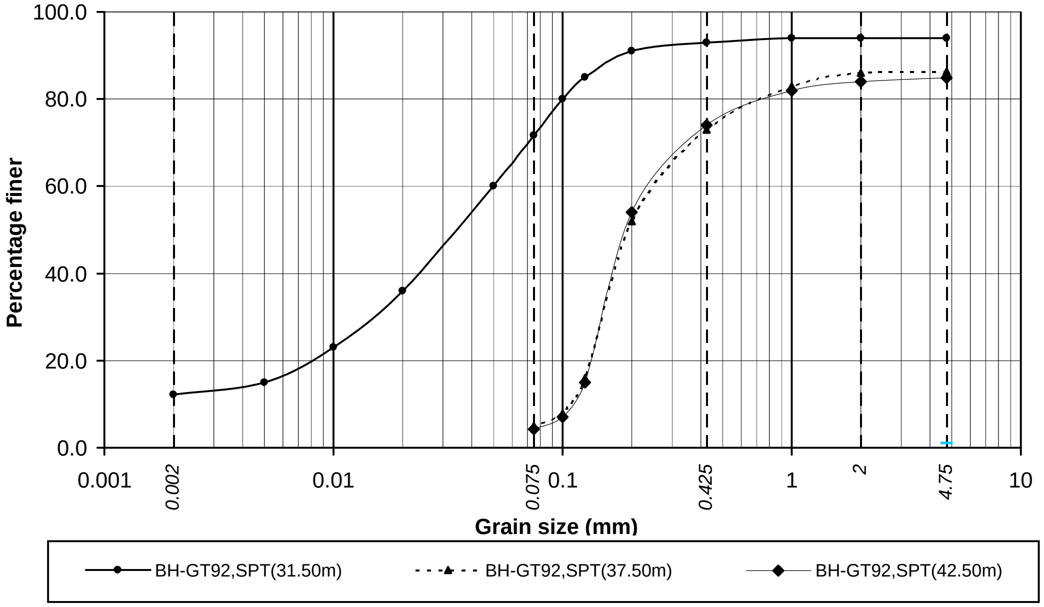
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT92,SPT(13.50m)	7.5		92.50	0.0
BH-GT92,SPT(19.50m)	4.6		95.40	0.0
BH-GT92,SPT(25.50m)	4.0		96.00	0.0

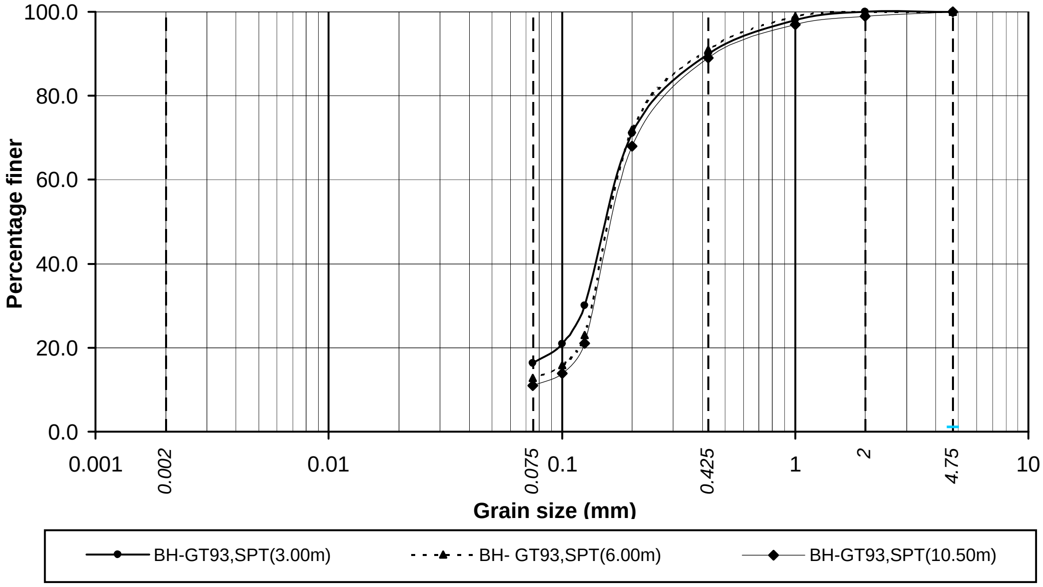
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT92,SPT(31.50m)	12.2	59.5	22.30	6.0
BH-GT92,SPT(37.50m)	5.0		81.30	13.7
BH-GT92,SPT(42.50m)	4.3		80.60	15.1

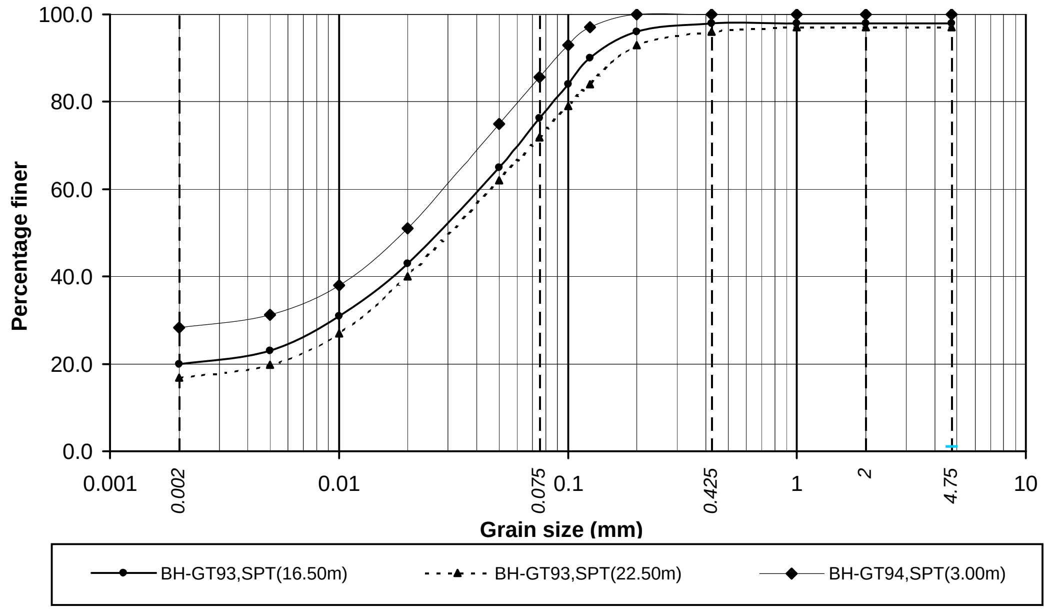
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT93,SPT(3.00m)	16.3		83.70	0.0
BH- GT93,SPT(6.00m)	12.8		87.20	0.0
BH-GT93,SPT(10.50m)	10.9		89.10	0.0

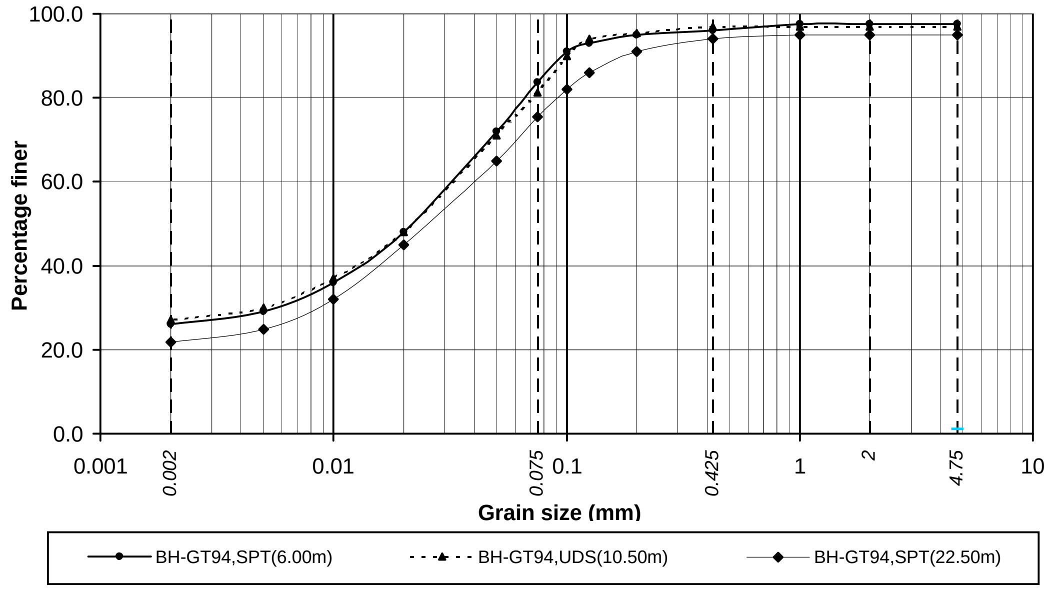
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT93,SPT(16.50m)	20.0	56.3	21.60	2.1
BH-GT93,SPT(22.50m)	16.8	55.1	25.20	2.9
BH-GT94,SPT(3.00m)	28.3	57.3	14.40	0.0

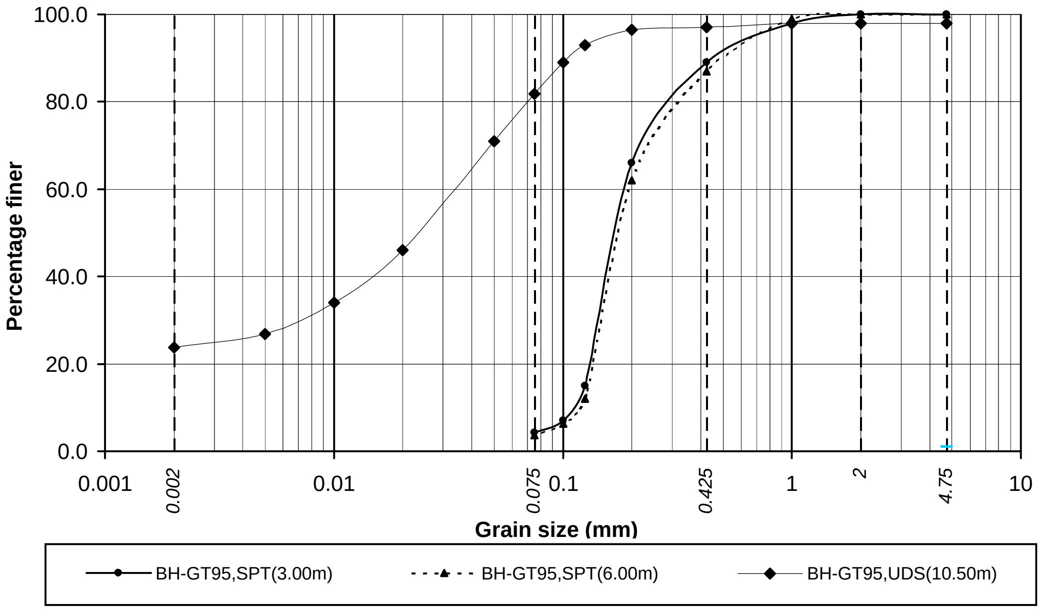
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT94,SPT(6.00m)	26.1	55.1	16.30	2.5
BH-GT94,UDS(10.50m)	27.1	54.2	15.60	3.1
BH-GT94,SPT(22.50m)	21.8	53.7	19.50	5.0

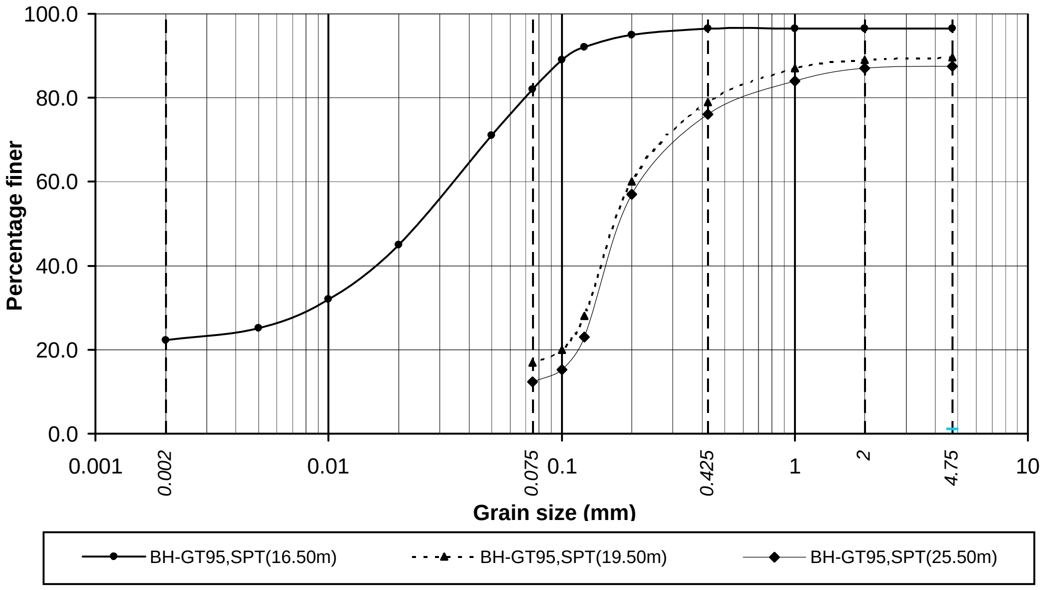
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT95,SPT(3.00m)	4.3		95.70	0.0
BH-GT95,SPT(6.00m)	3.6		96.40	0.0
BH-GT95,UDS(10.50m)	23.8	58.0	16.10	2.1

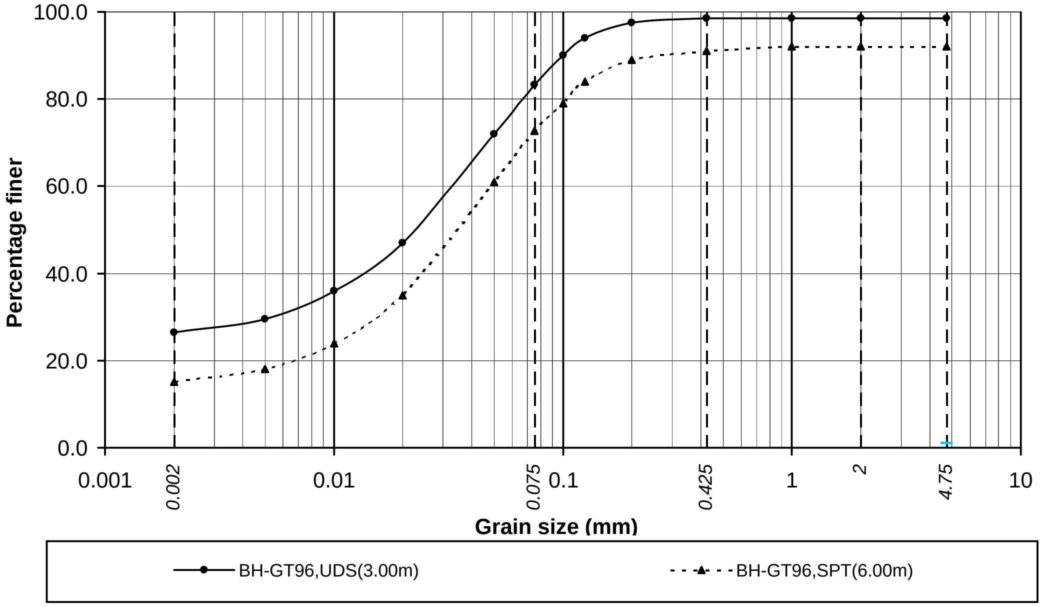
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT95,SPT(16.50m)	22.2	56.3	18.00	3.5
BH-GT95,SPT(19.50m)	16.9		72.70	10.4
BH-GT95,SPT(25.50m)	12.3		75.20	12.5

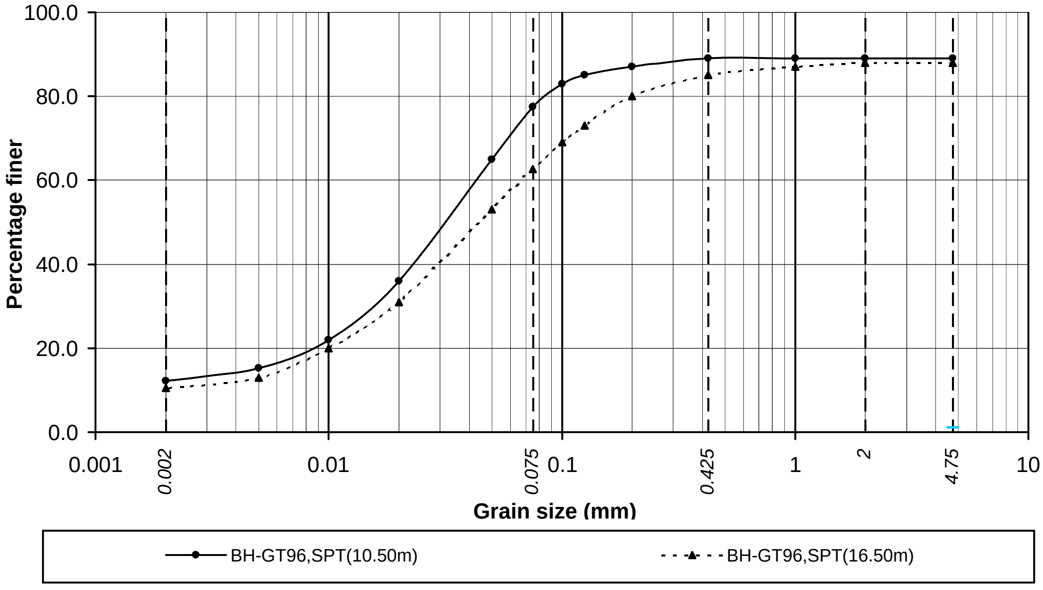
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT96,UDS(3.00m)	26.4	56.8	15.40	1.4
BH-GT96,SPT(6.00m)	15.1	57.6	19.40	7.9

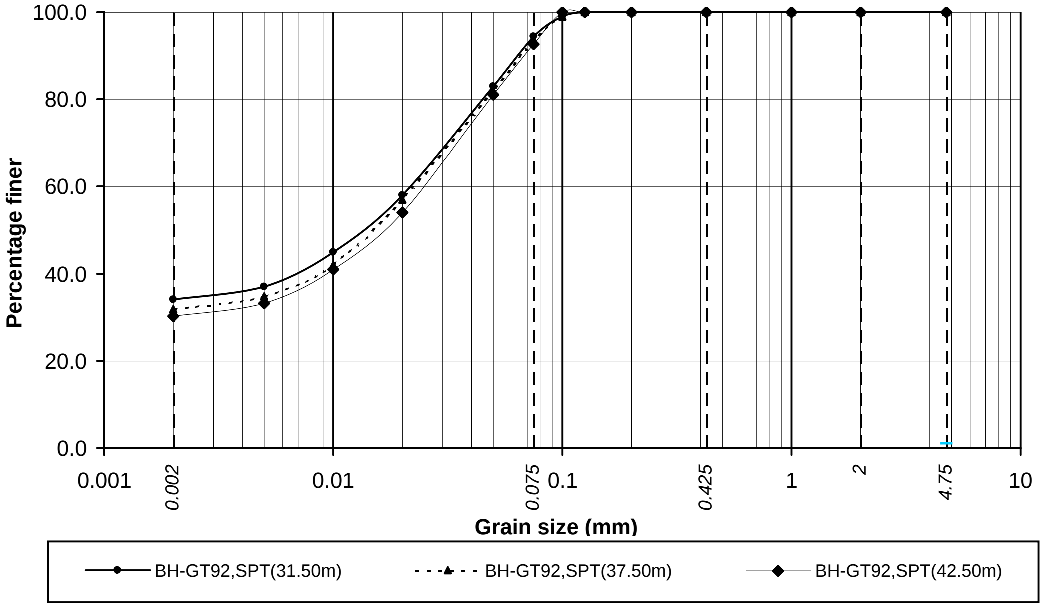
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT96,SPT(10.50m)	12.2	54.3	22.50	11.0
BH-GT96,SPT(16.50m)	10.5	52.1	25.30	12.1

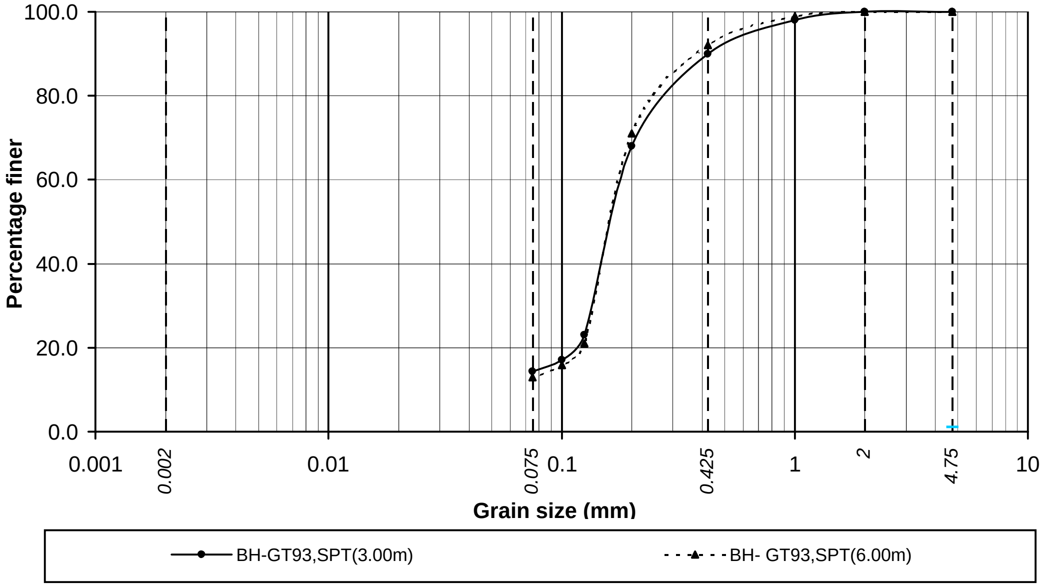
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT92,SPT(31.50m)	34.0	60.4	5.60	0.0
BH-GT92,SPT(37.50m)	61.7		6.50	0.0
BH-GT92,SPT(42.50m)	62.5		7.30	0.0

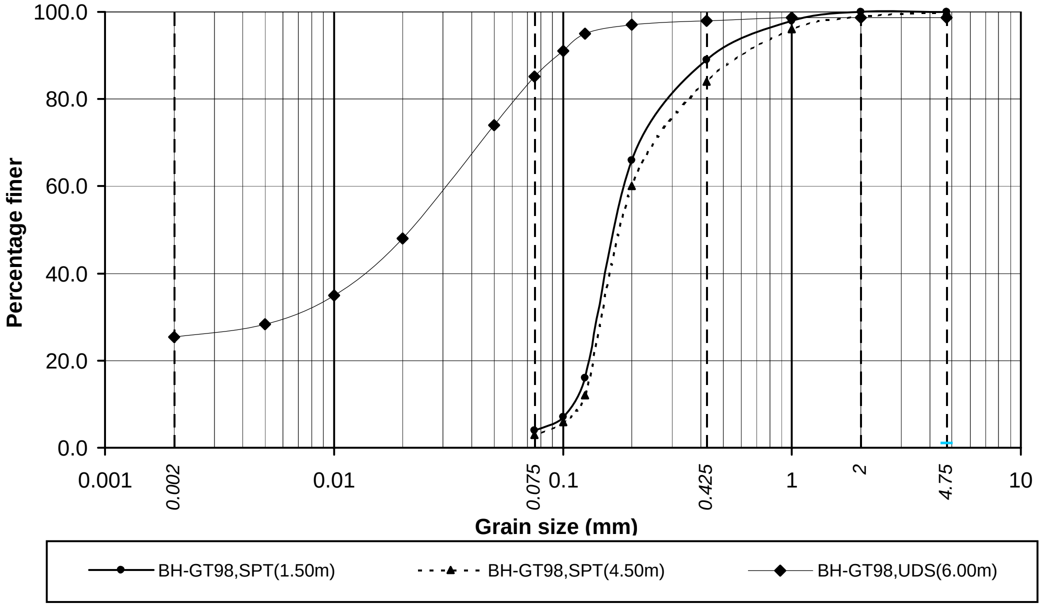
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-4.75	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT93,SPT(3.00m)	14.4		85.60	0.0
BH- GT93,SPT(6.00m)	12.9		78.10	9.0

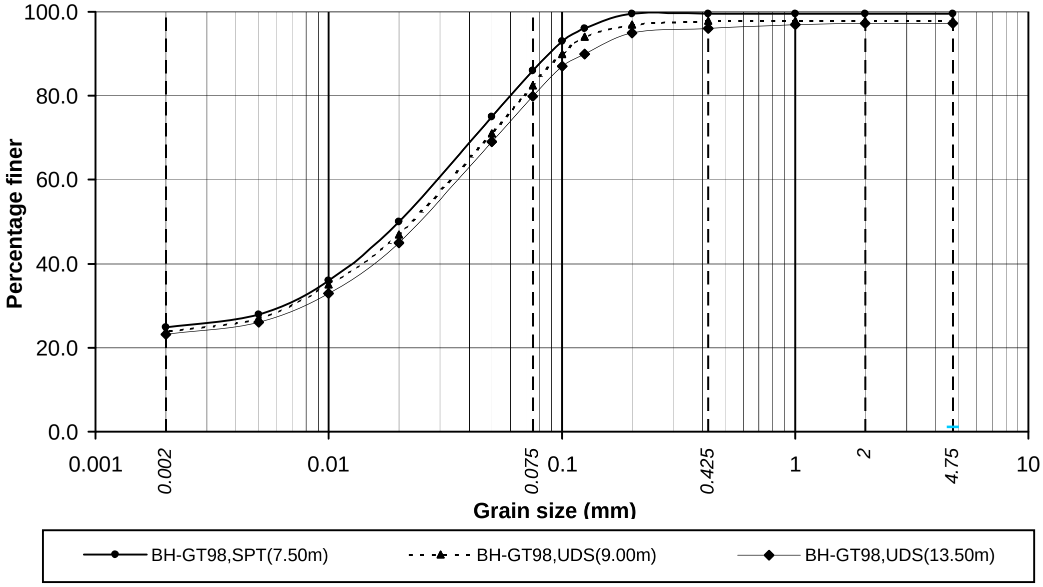
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT98,SPT(1.50m)	0.0	4.0	96.00	0.0
BH-GT98,SPT(4.50m)	0.0	2.9	97.10	0.0
BH-GT98,UDS(6.00m)	25.4	59.8	13.50	1.3

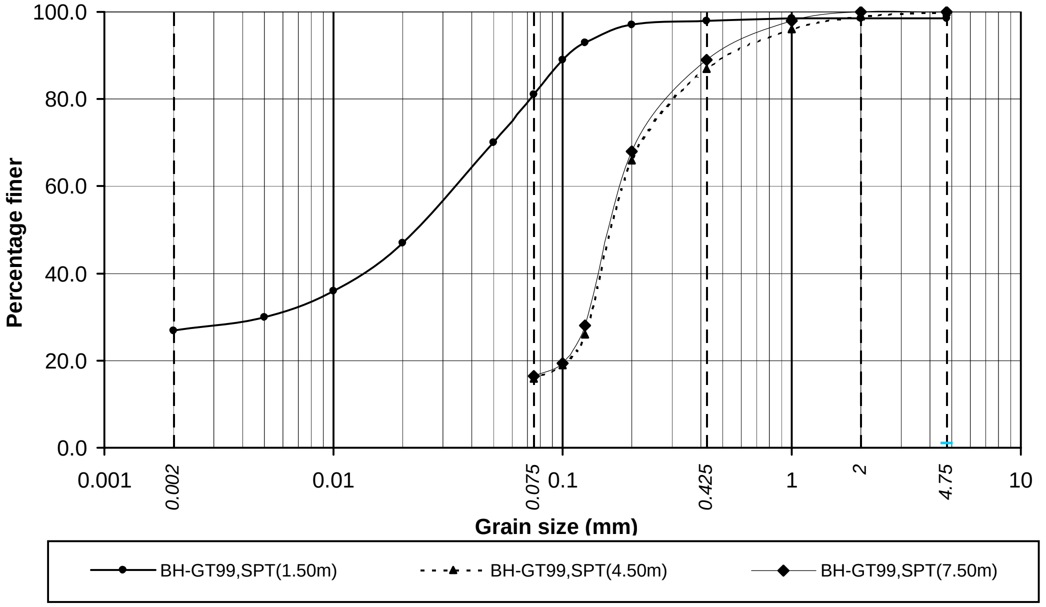
GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT98,SPT(7.50m)	24.9	60.6	14.00	0.5
BH-GT98,UDS(9.00m)	24.0	58.5	15.40	2.1
BH-GT98,UDS(13.50m)	23.1	56.8	17.30	2.8

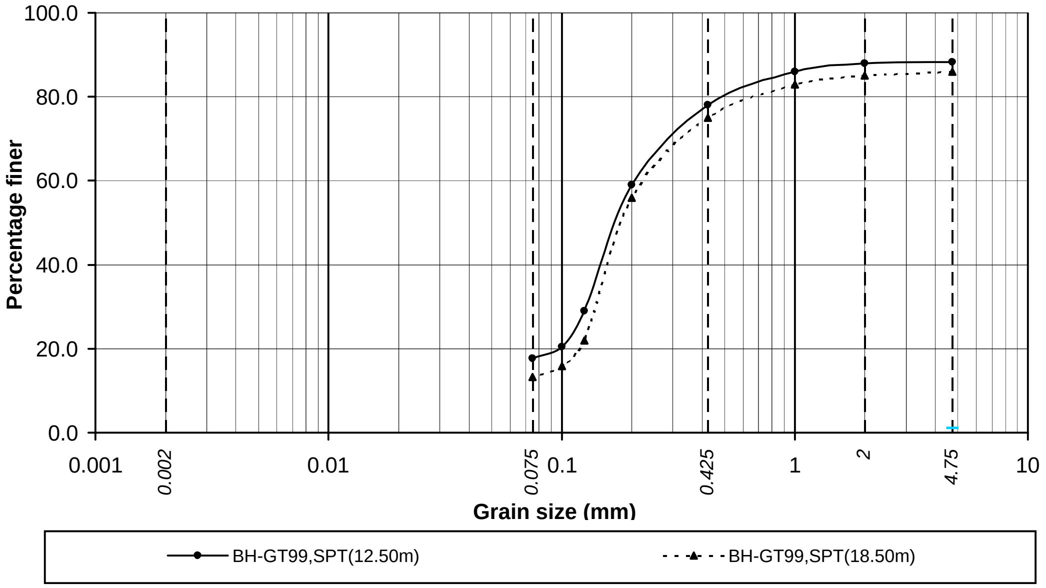
*Silt & Clay

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT99,SPT(1.50m)	26.9	54.2	17.50	1.4
BH-GT99,SPT(4.50m)	15.9		84.10	0.0
BH-GT99,SPT(7.50m)	16.4		83.60	0.0

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-4.75*	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Sand (%)**	**Gravel (%)**
BH-GT99,SPT(12.50m)	17.7		70.60	11.7
BH-GT99,SPT(18.50m)	13.2		72.80	14.0

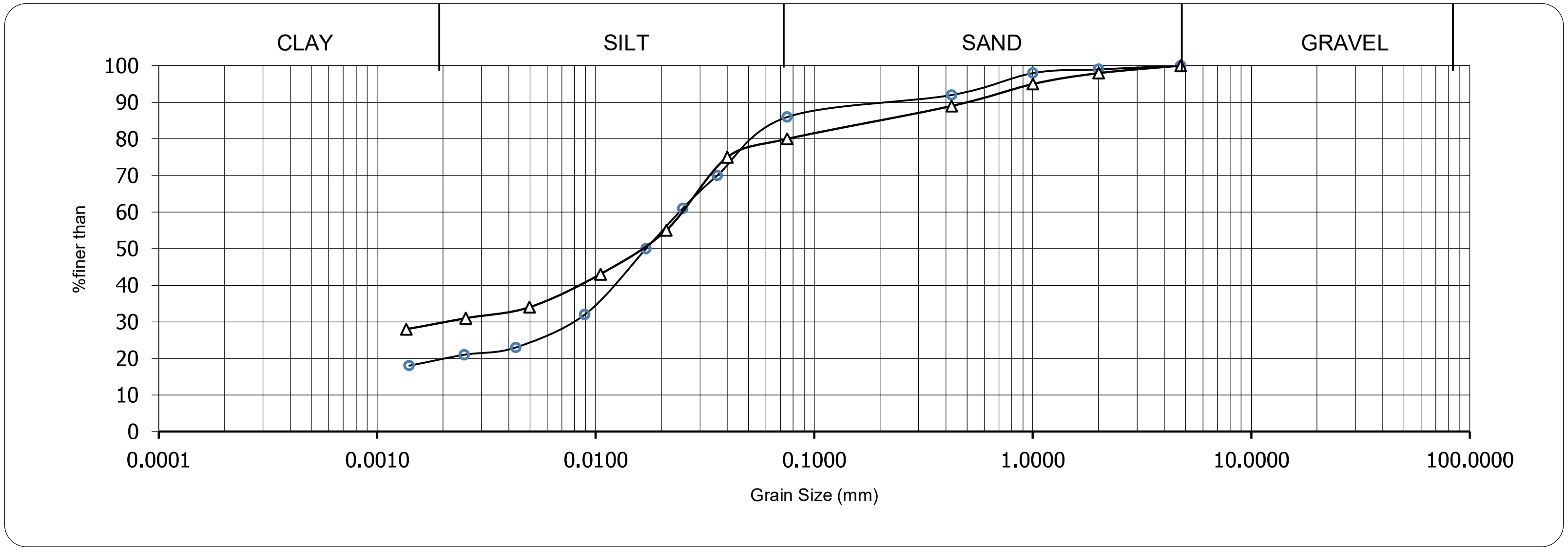
*Silt & Clay

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

GRAIN SIZE DISTRIBUTION CURVE



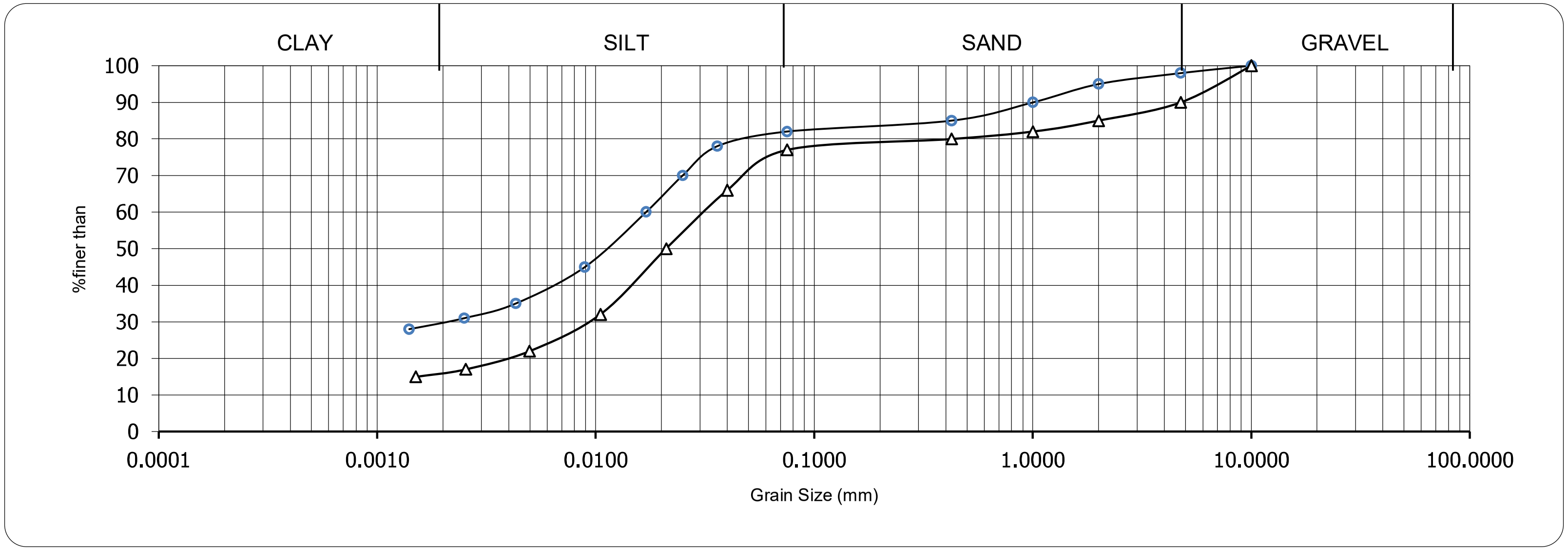
Symbol	BH NO	Depth (m)
○	GT 101A	3.50-3.95
△	GT 102	3.0-3.45

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

GRAIN SIZE DISTRIBUTION CURVE



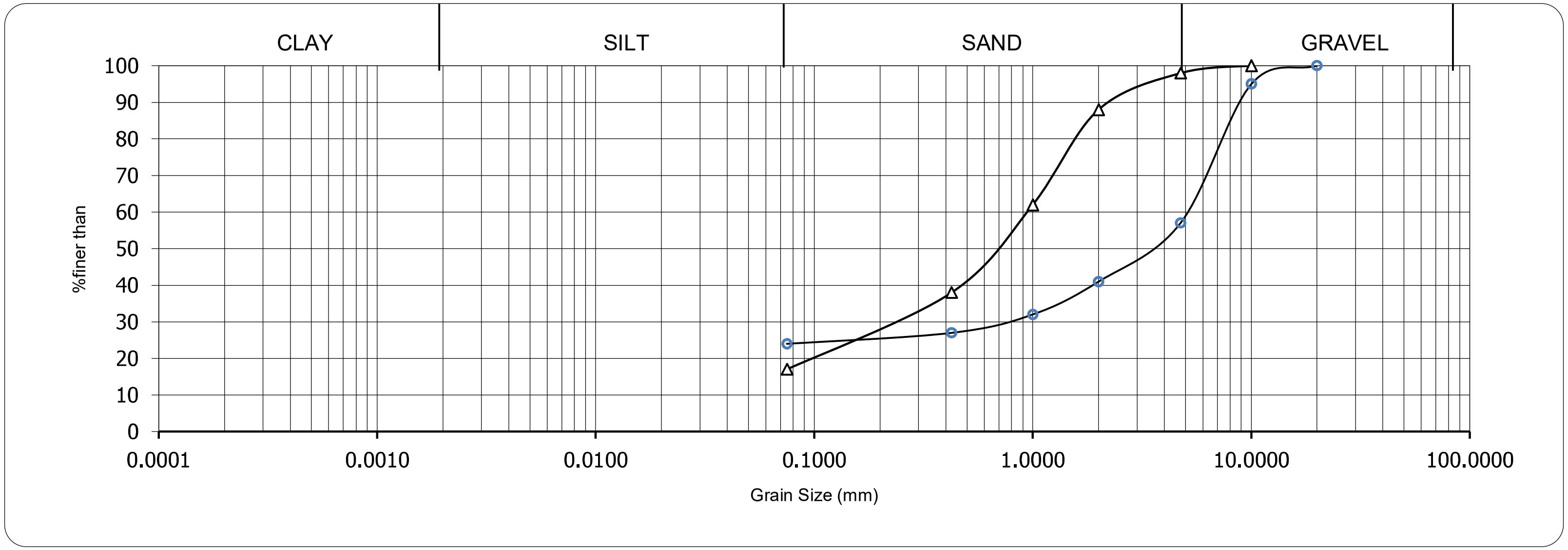
Symbol	BH NO	Depth (m)
○	GT 103A	3.0-3.45
△	GT 104	4.50-4.95

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

GRAIN SIZE DISTRIBUTION CURVE



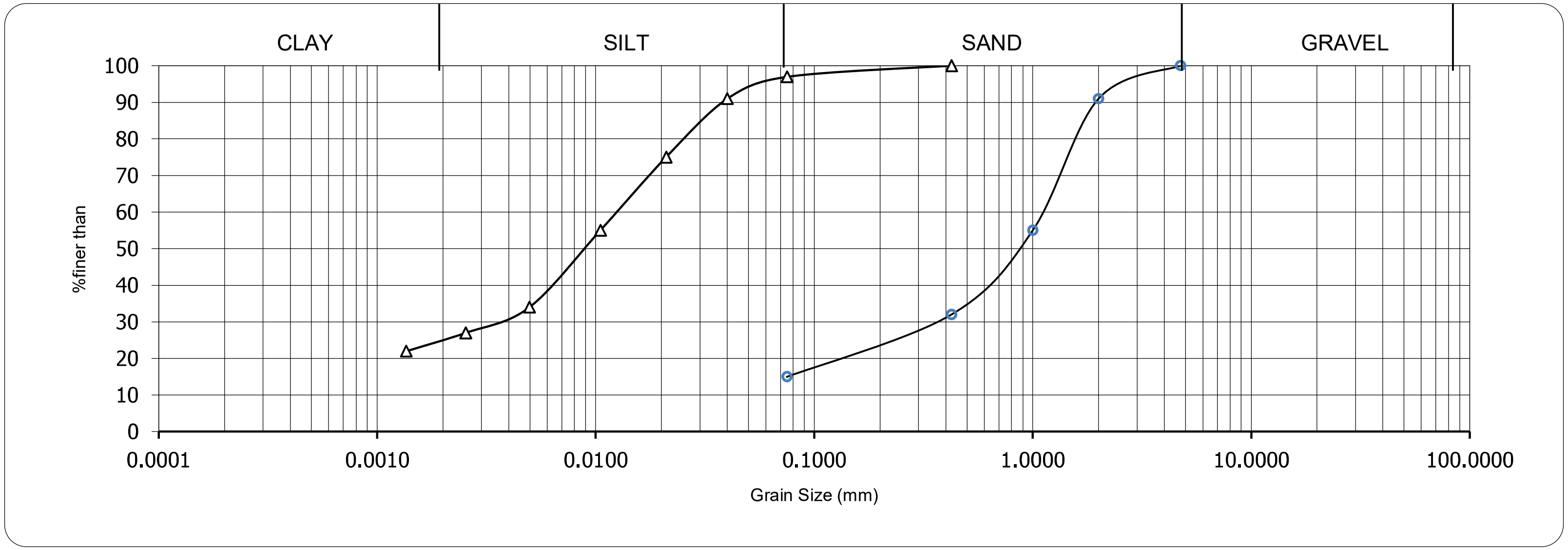
Symbol	BH NO	Depth (m)
○	GT 105A	6.0-6.45
△	GT 106	3.50-3.95

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

GRAIN SIZE DISTRIBUTION CURVE



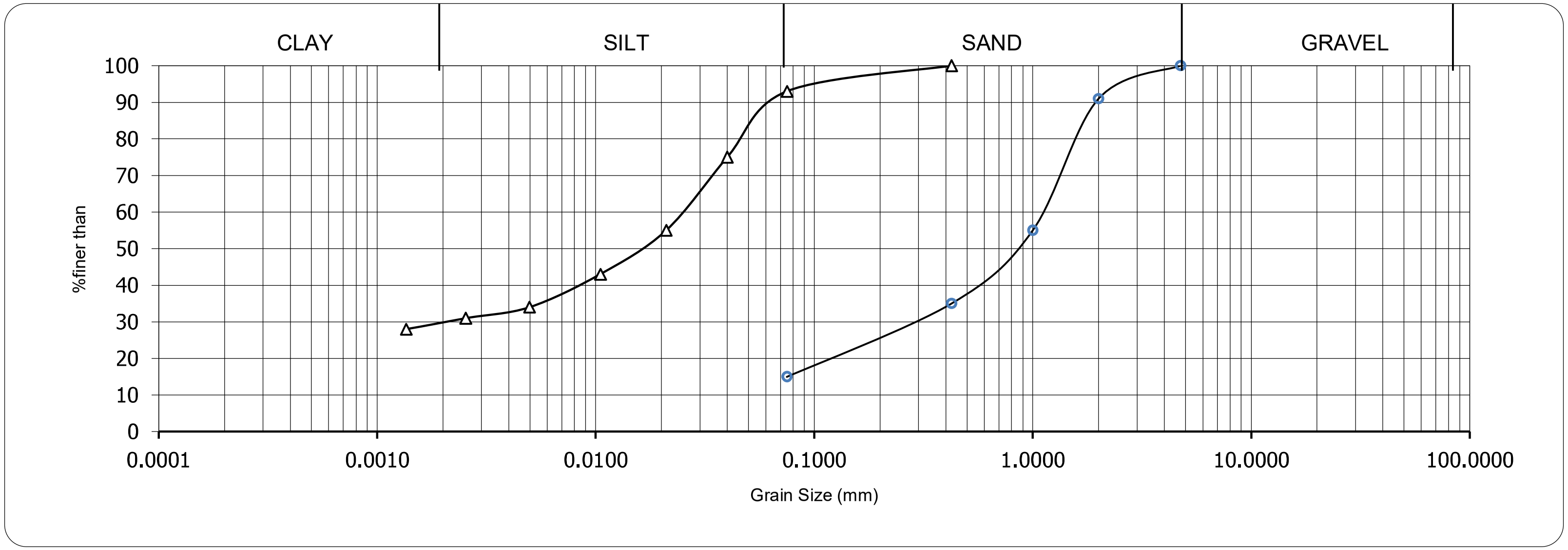
Symbol	BH NO	Depth (m)
○	GT 107A	7.50-7.95
△	GT 108A	13.50-13.95

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

GRAIN SIZE DISTRIBUTION CURVE



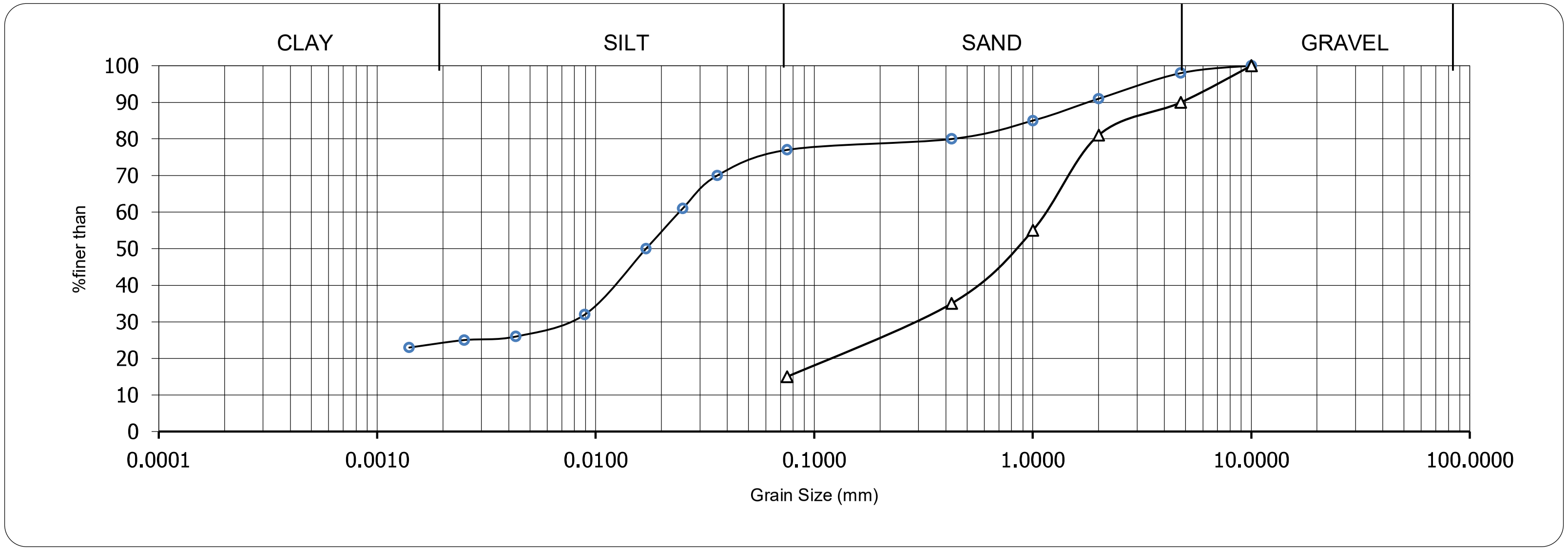
Symbol	BH NO	Depth (m)
○	GT 111A	3.0-3.45
△	GT 112	26.0-26.45

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

GRAIN SIZE DISTRIBUTION CURVE



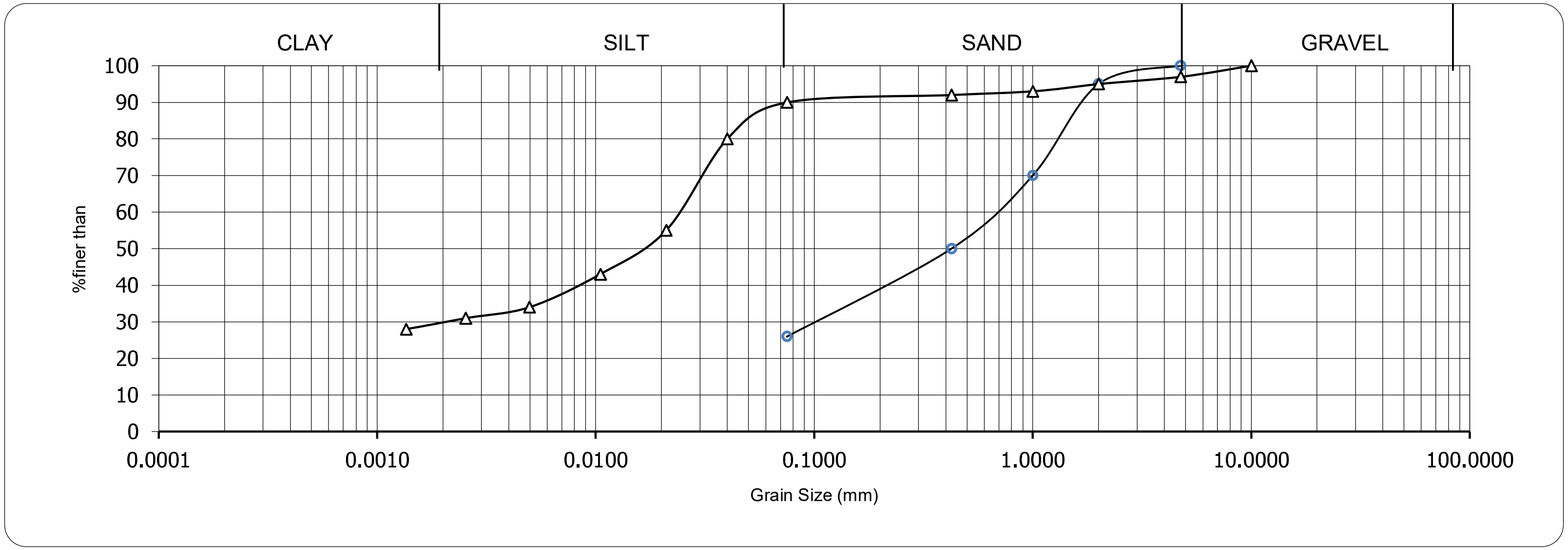
Symbol	BH NO	Depth (m)
○	GT 56A	4.50-4.95
△	GT 59	1.50-1.95

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

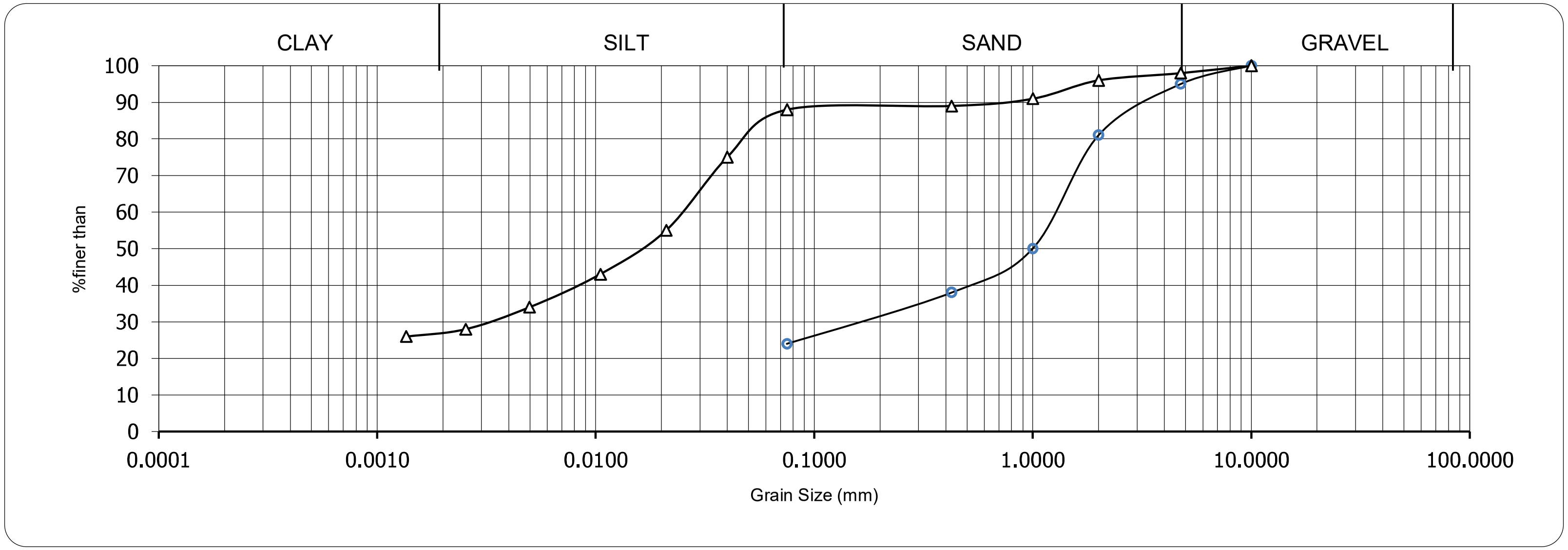
GRAIN SIZE DISTRIBUTION CURVE



Symbol	BH NO	Depth (m)
○	GT 100A	3.0-3.45
△	GT 109	6.0-6.45

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

GRAIN SIZE DISTRIBUTION CURVE



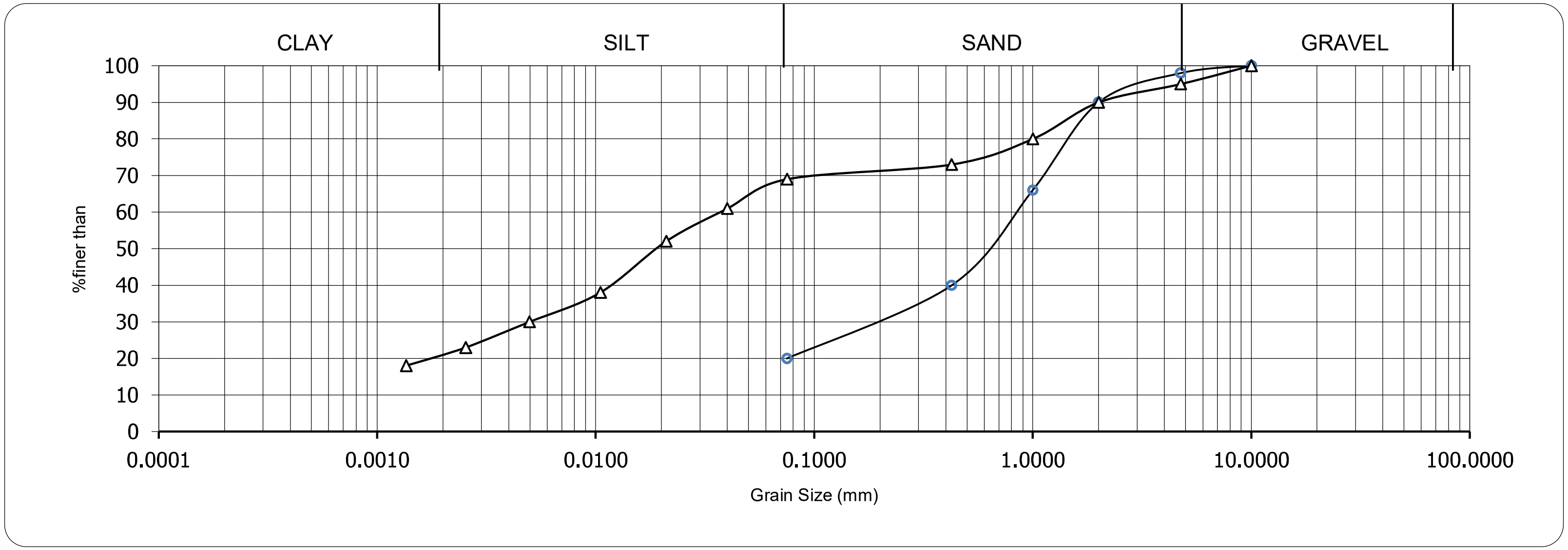
Symbol	BH NO	Depth (m)
○	GT 110	3.0-3.45
△	GT 113	7.50-7.95

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

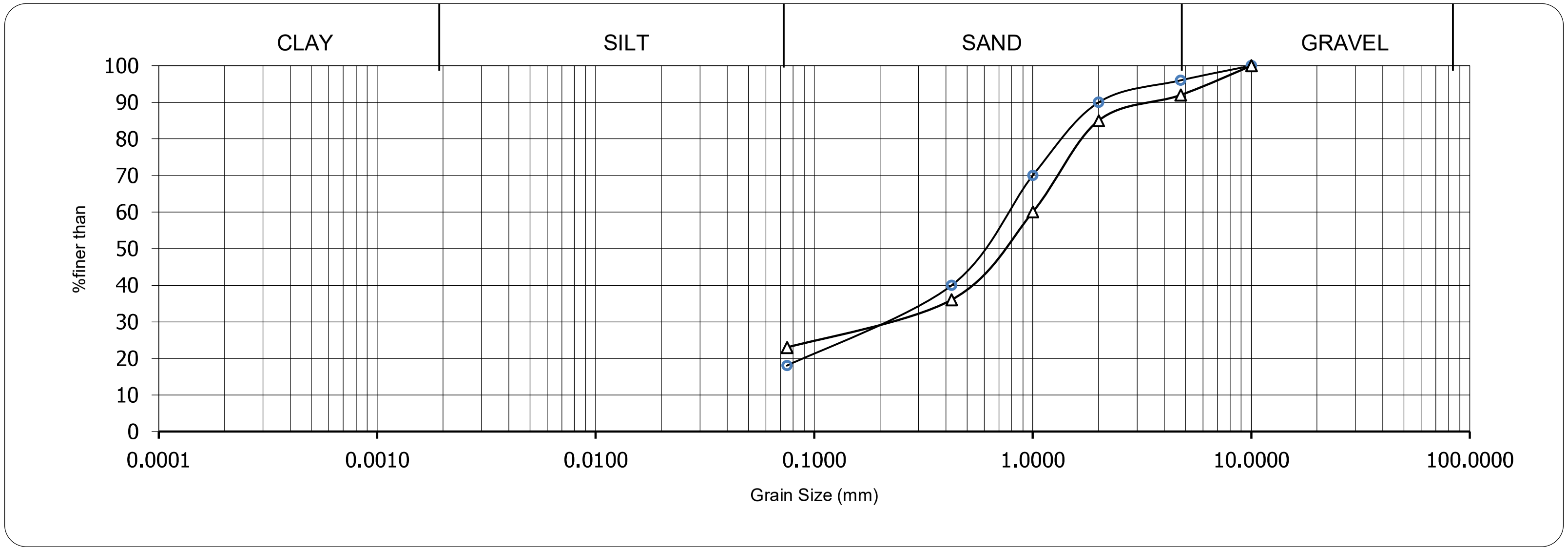
GRAIN SIZE DISTRIBUTION CURVE



Symbol	BH NO	Depth (m)
○	GT 114	6.0-6.45
△	GT 115	7.50-7.95

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

GRAIN SIZE DISTRIBUTION CURVE



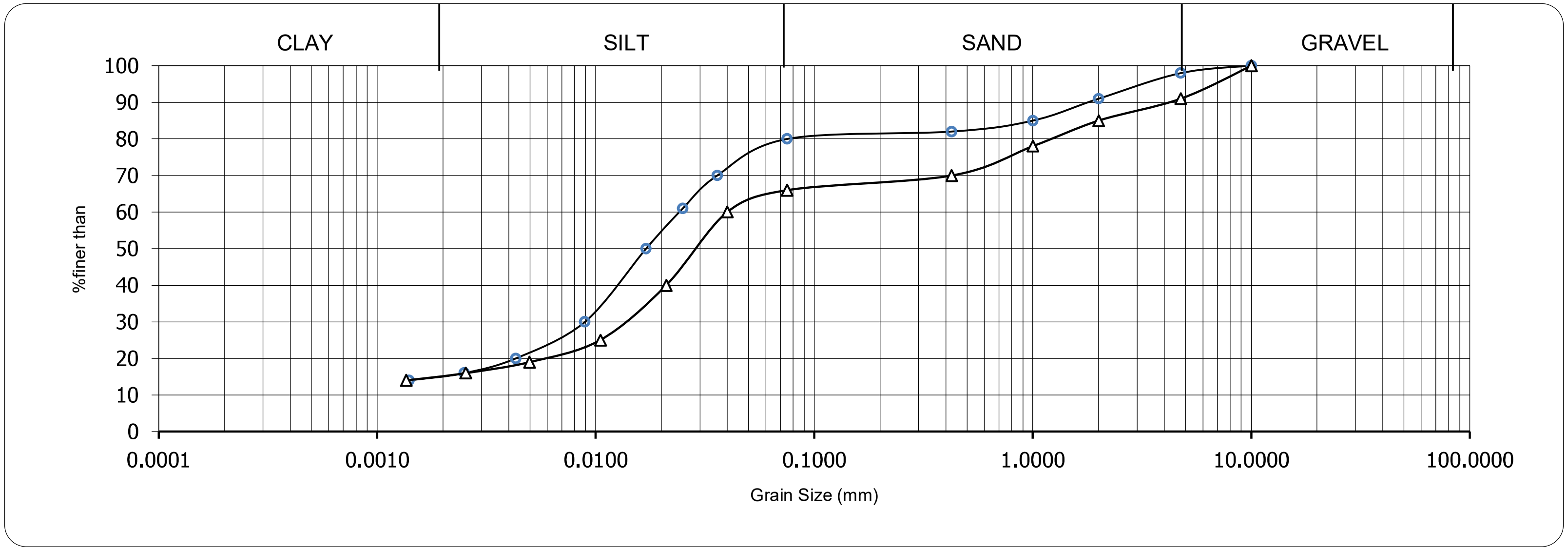
Symbol	BH NO	Depth (m)
○	GT 116	1.50-1.95
△	GT 117	3.0-3.45

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

GRAIN SIZE DISTRIBUTION CURVE



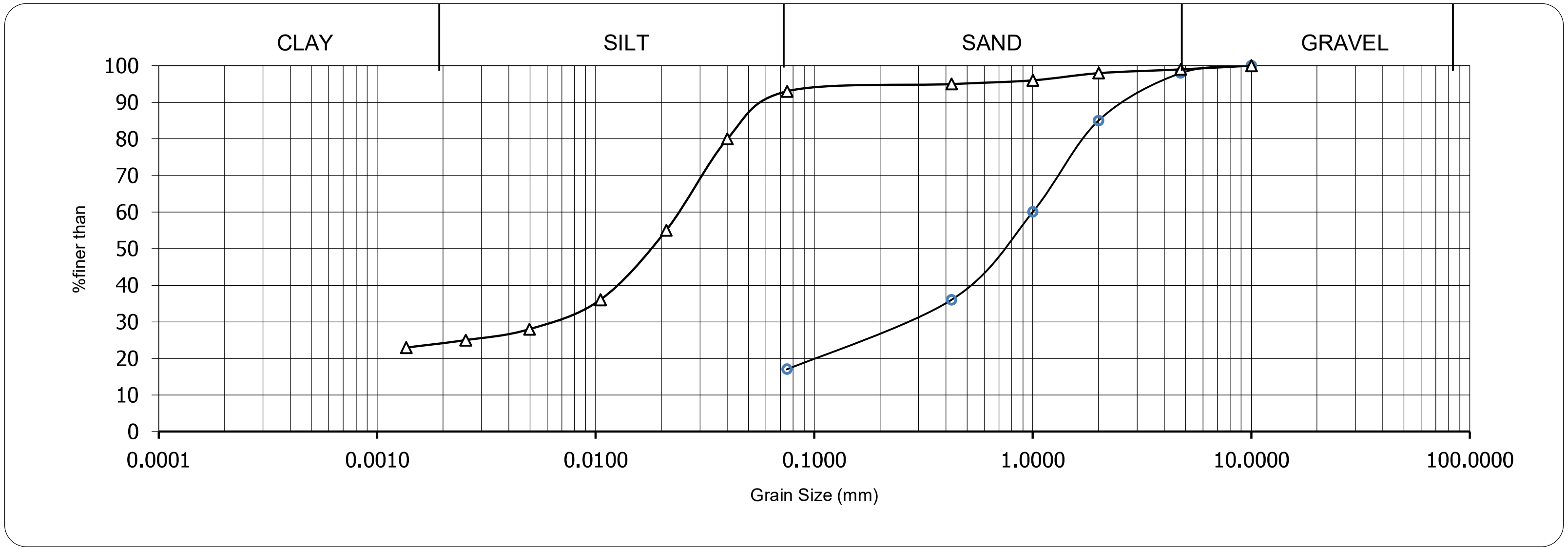
Symbol	BH NO	Depth (m)
○	GT 118	3.0-3.45
△	GT 119A	3.0-3.45

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

GRAIN SIZE DISTRIBUTION CURVE



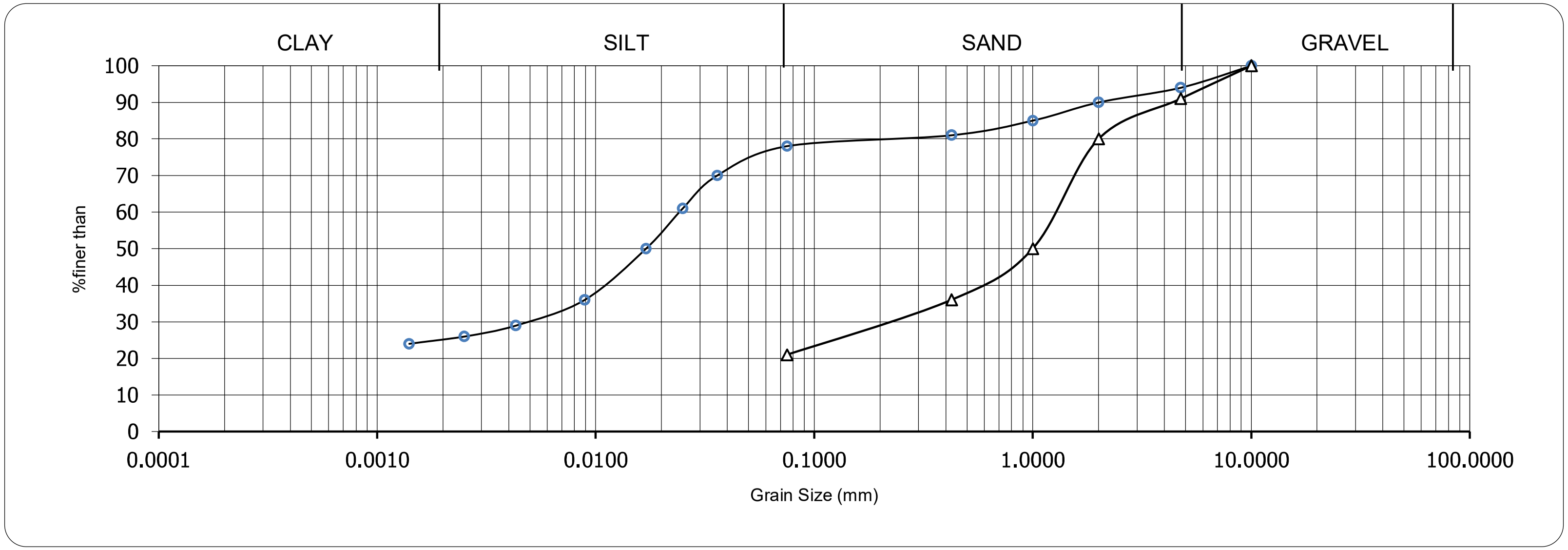
Symbol	BH NO	Depth (m)
○	GT 120A	6.0-6.45
△	GT 121	10.50-10.95

M/s ANAND RAJ INFRATECH PVT. LTD.

Fatuha,Patna,Bihar

Project Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

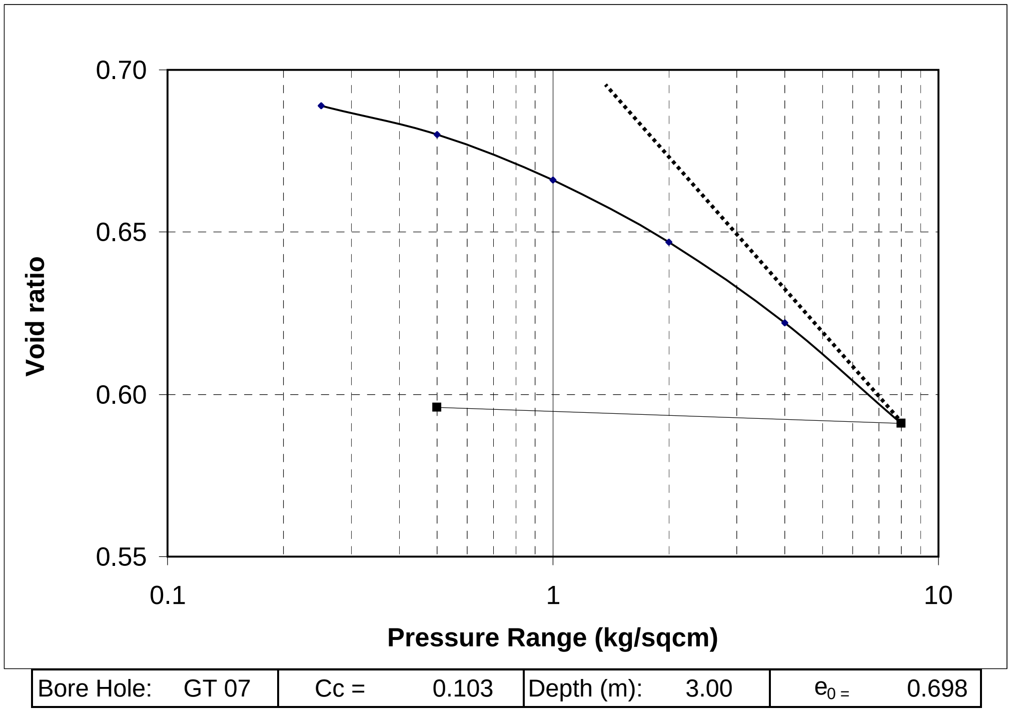
GRAIN SIZE DISTRIBUTION CURVE



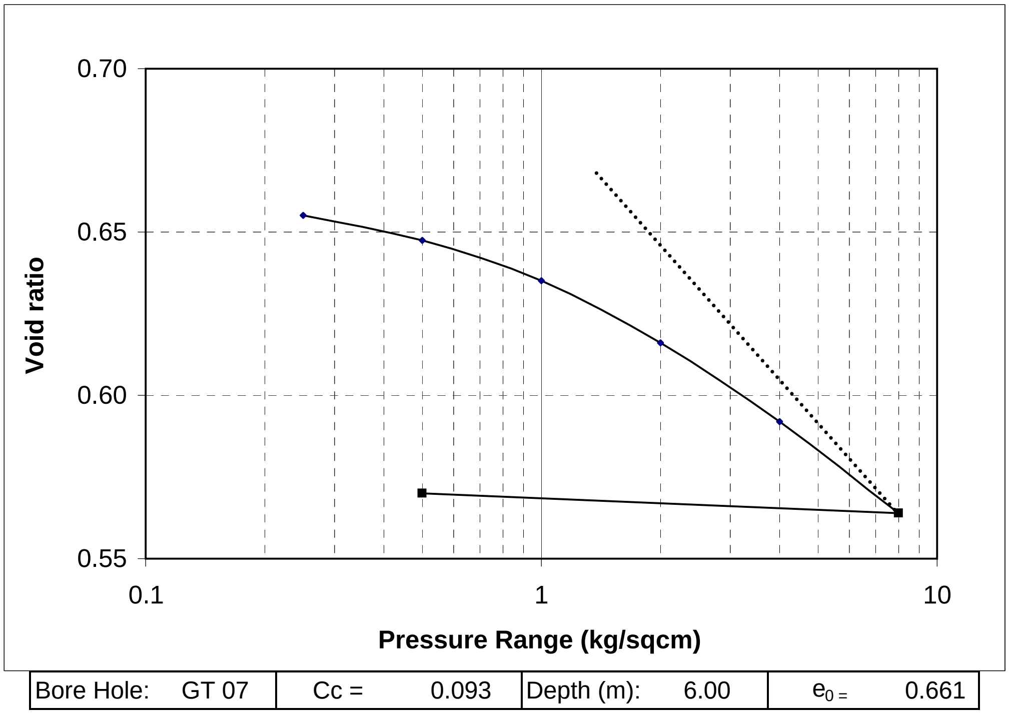
Symbol	BH NO	Depth (m)
○	GT 122	7.50-7.95
△	GT 123A	10.50-10.95

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

e-logp curve



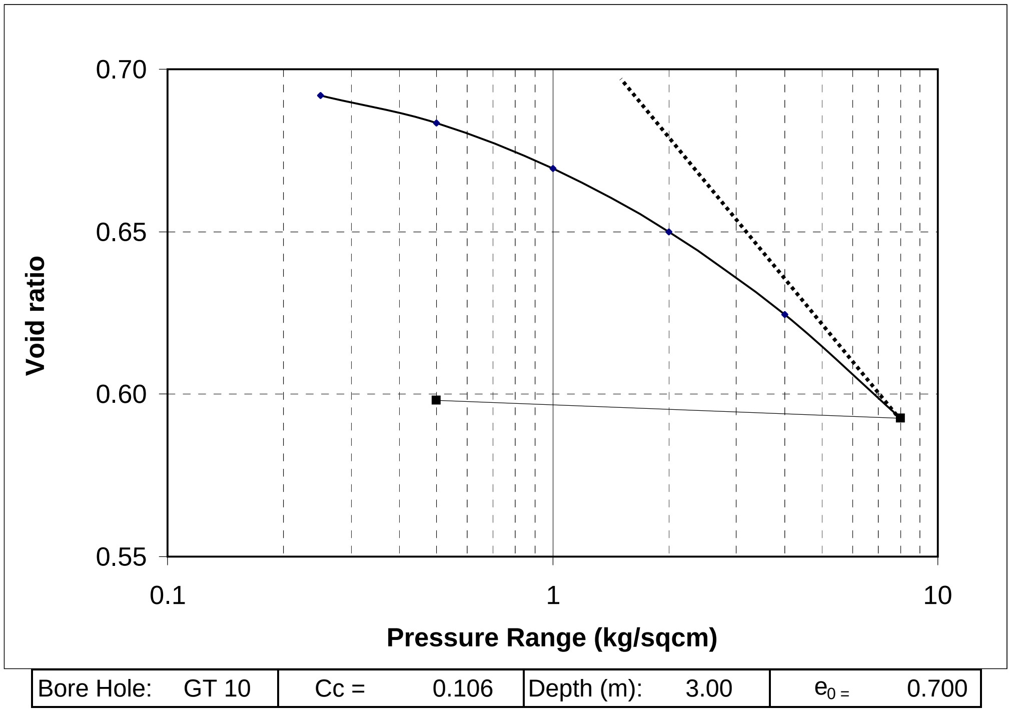
Bore Hole: GT 07	Cc = 0.103	Depth (m): 3.00	e_{0} = 0.698



Bore Hole: GT 07	Cc = 0.093	Depth (m): 6.00	e_{0} = 0.661

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

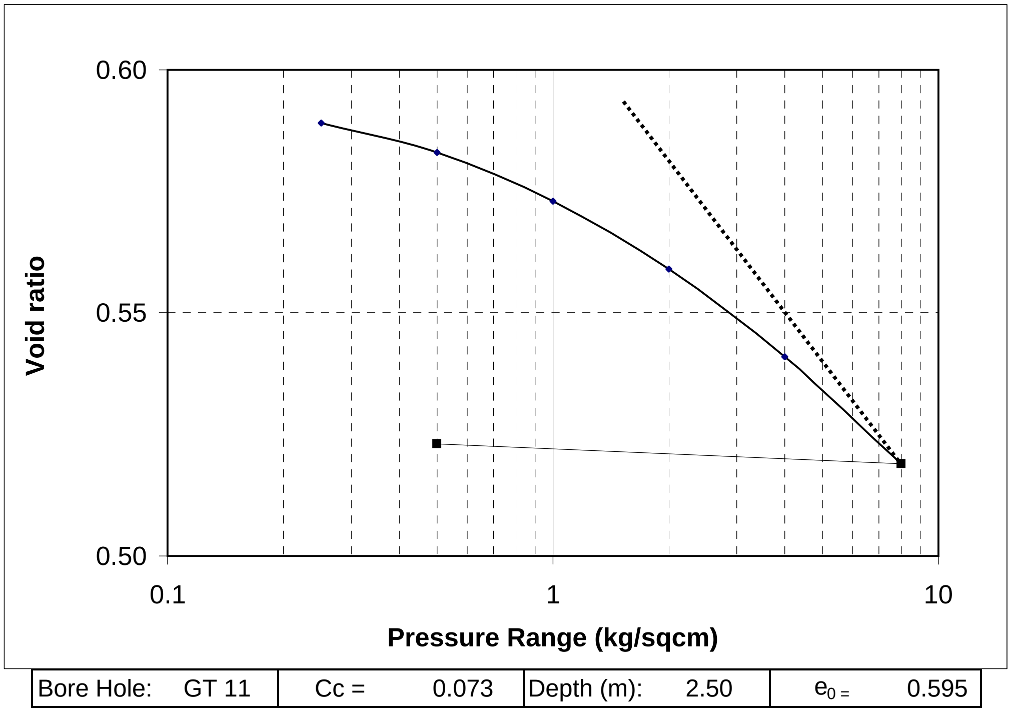
e-logp curve



Bore Hole: GT 10	Cc = 0.106	Depth (m): 3.00	e_{0} = 0.700

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

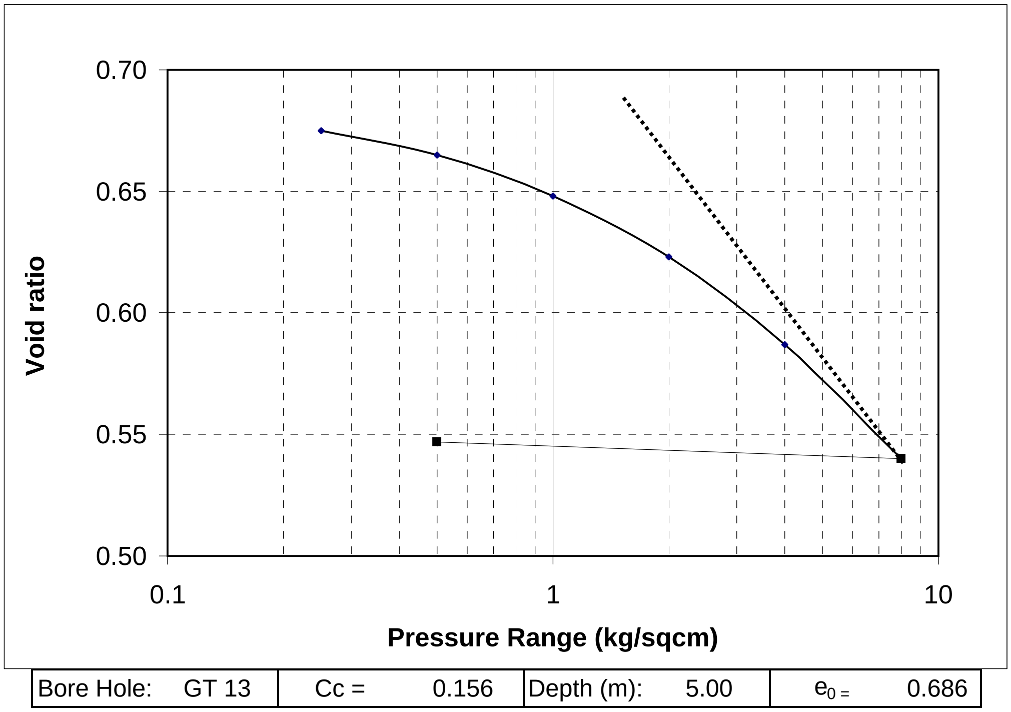
e-logp curve



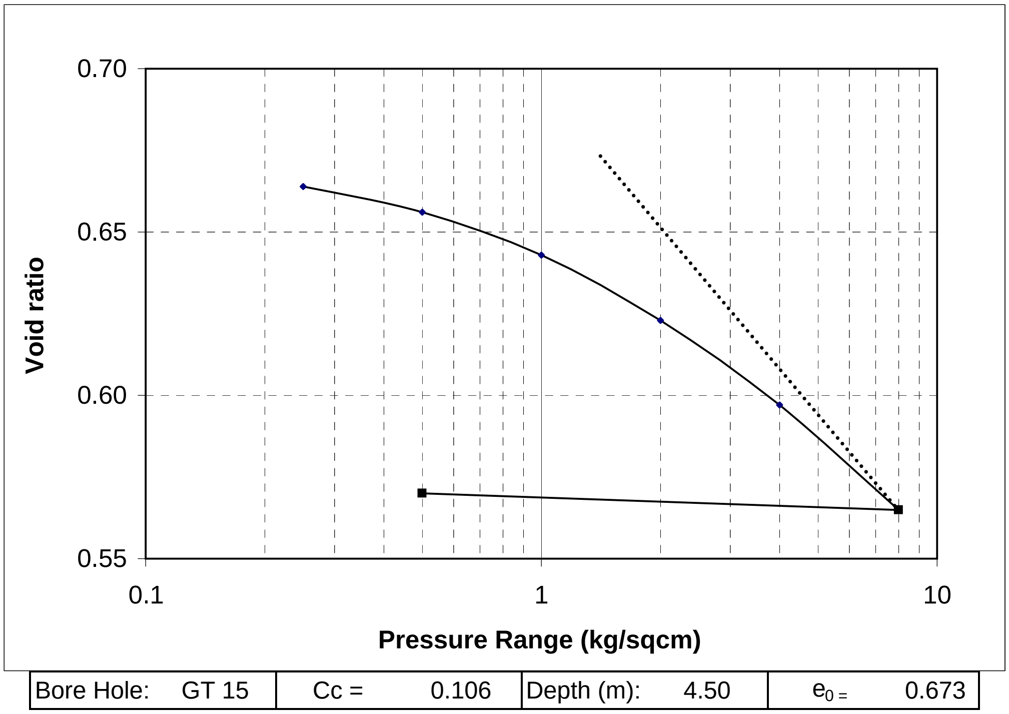
Bore Hole:	GT 11	Cc =	0.073	Depth (m):	2.50	$e_{0} =$	0.595

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

e-logp curve



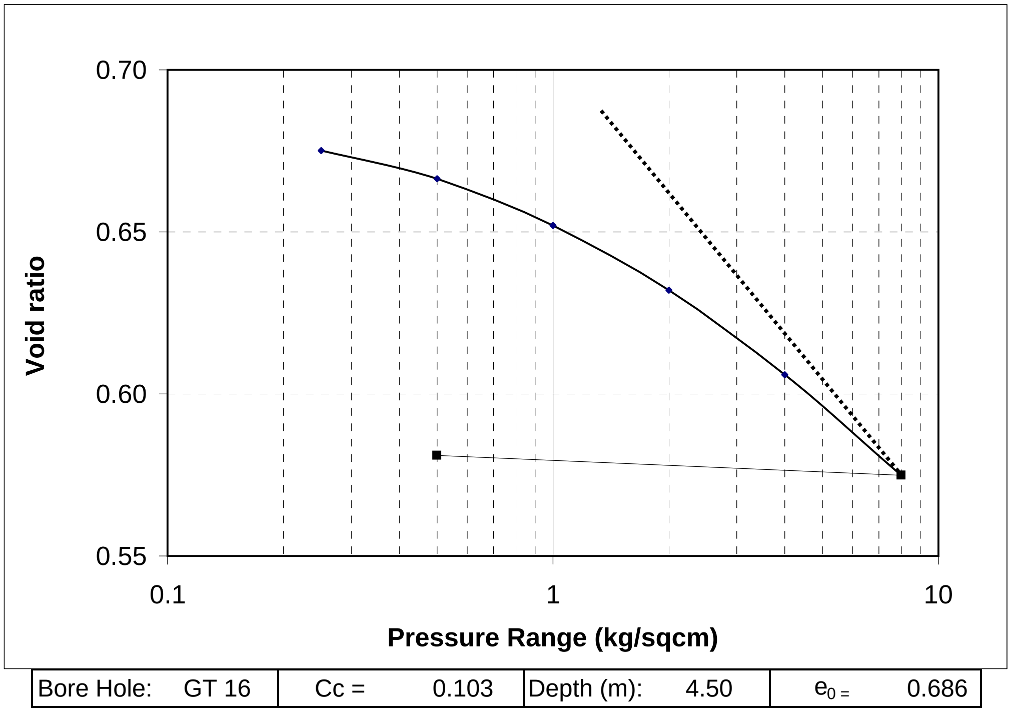
Bore Hole:	GT 13	Cc =	0.156	Depth (m):	5.00	$e_{0} =$	0.686



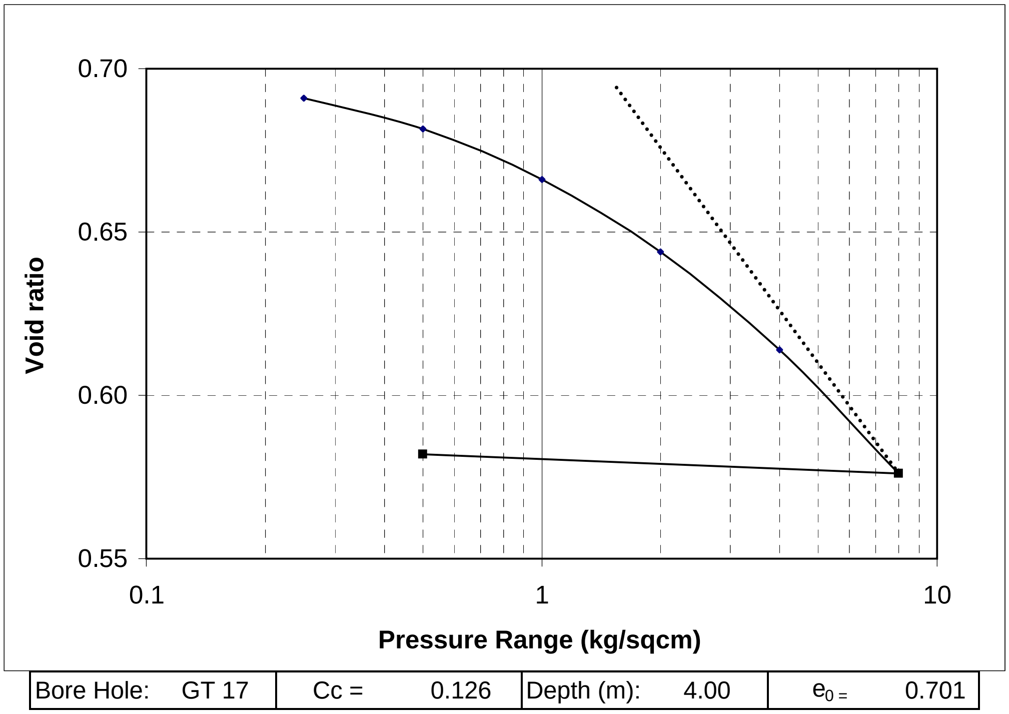
Bore Hole:	GT 15	Cc =	0.106	Depth (m):	4.50	$e_{0} =$	0.673

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

e-logp curve



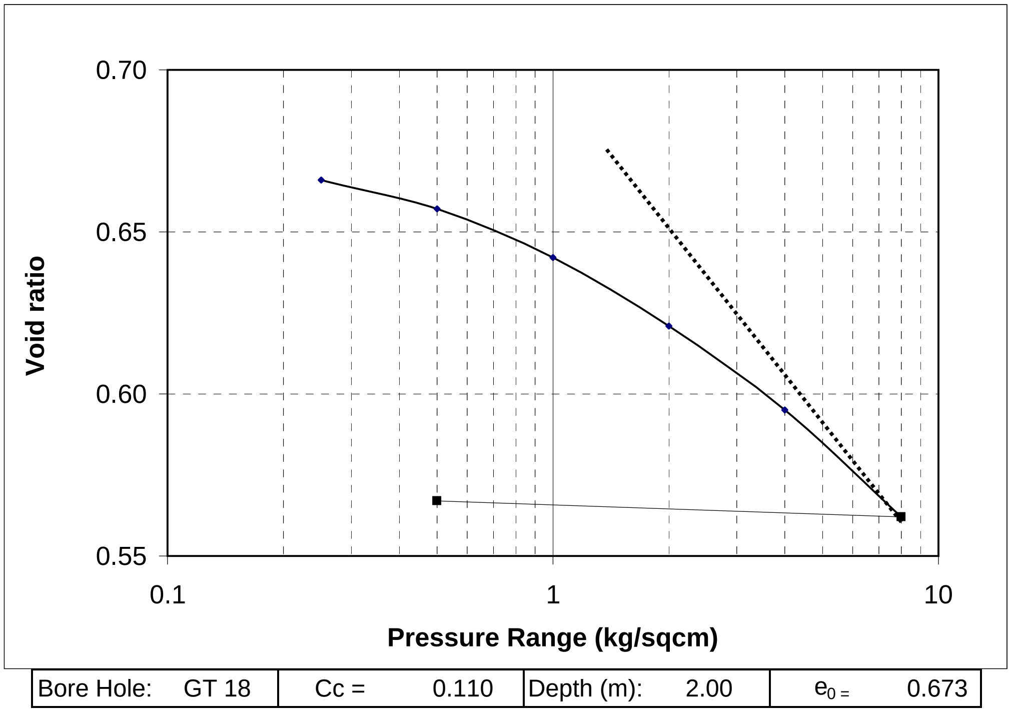
Bore Hole:	GT 16	Cc =	0.103	Depth (m):	4.50	e_{0} =	0.686



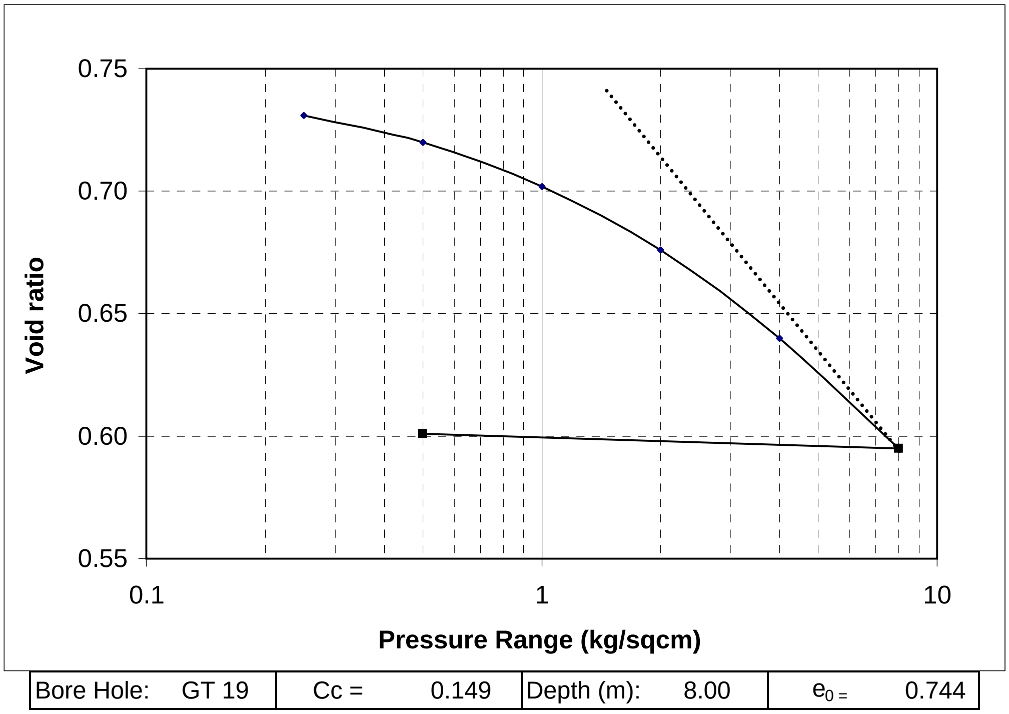
Bore Hole:	GT 17	Cc =	0.126	Depth (m):	4.00	e_{0} =	0.701

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

e-logp curve



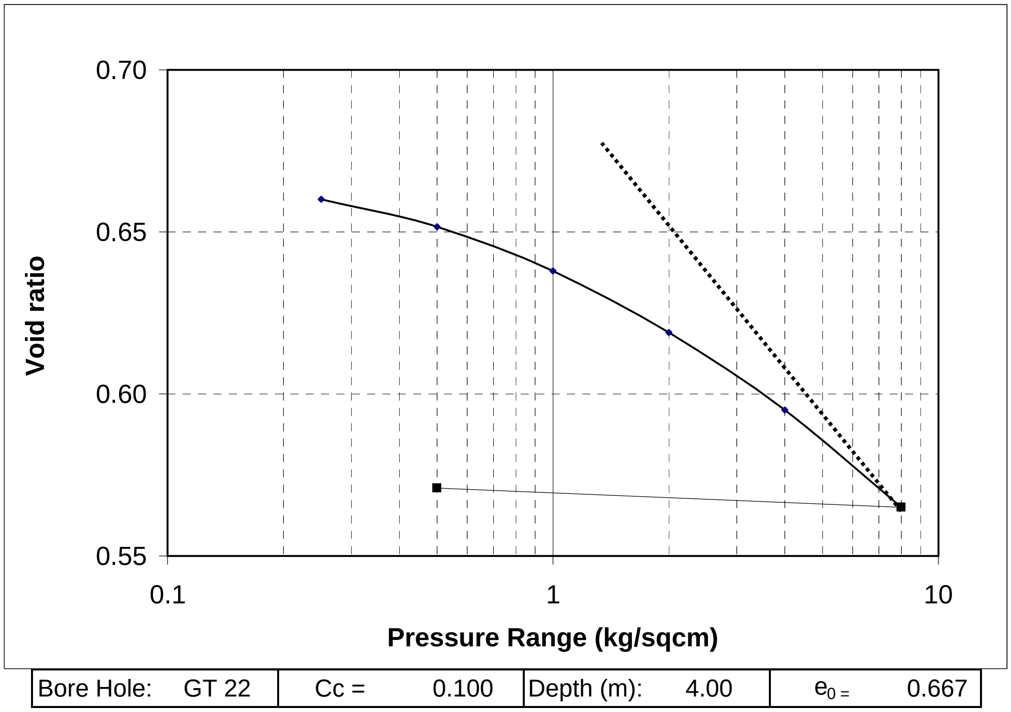
Bore Hole:	GT 18	Cc =	0.110	Depth (m):	2.00	e_{0} =	0.673



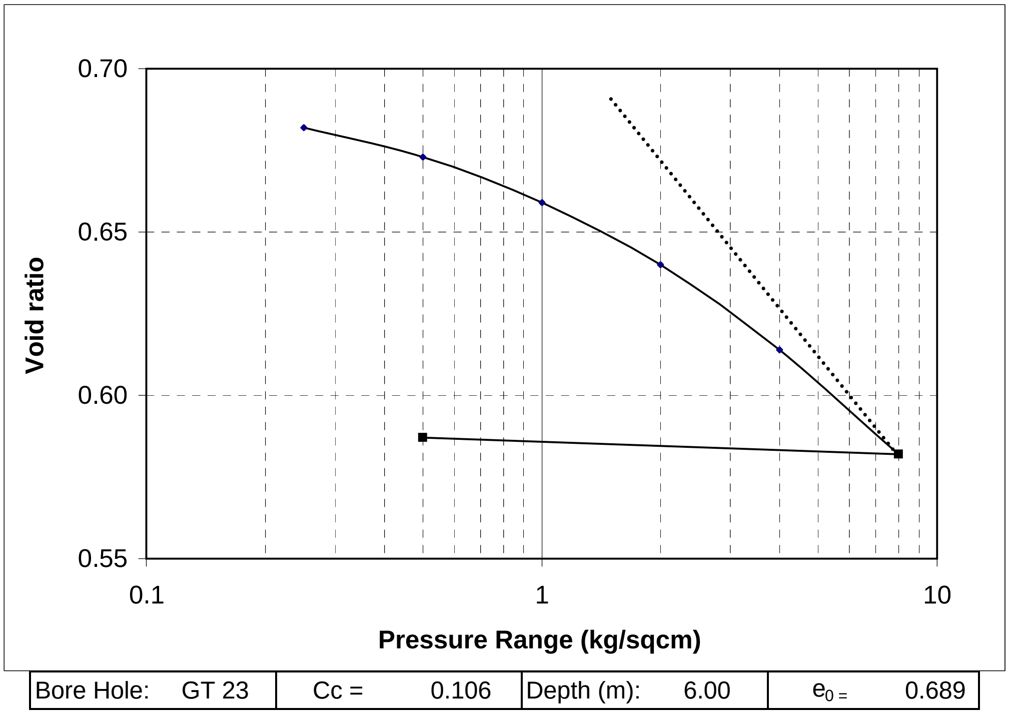
Bore Hole:	GT 19	Cc =	0.149	Depth (m):	8.00	e_{0} =	0.744

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

e-logp curve



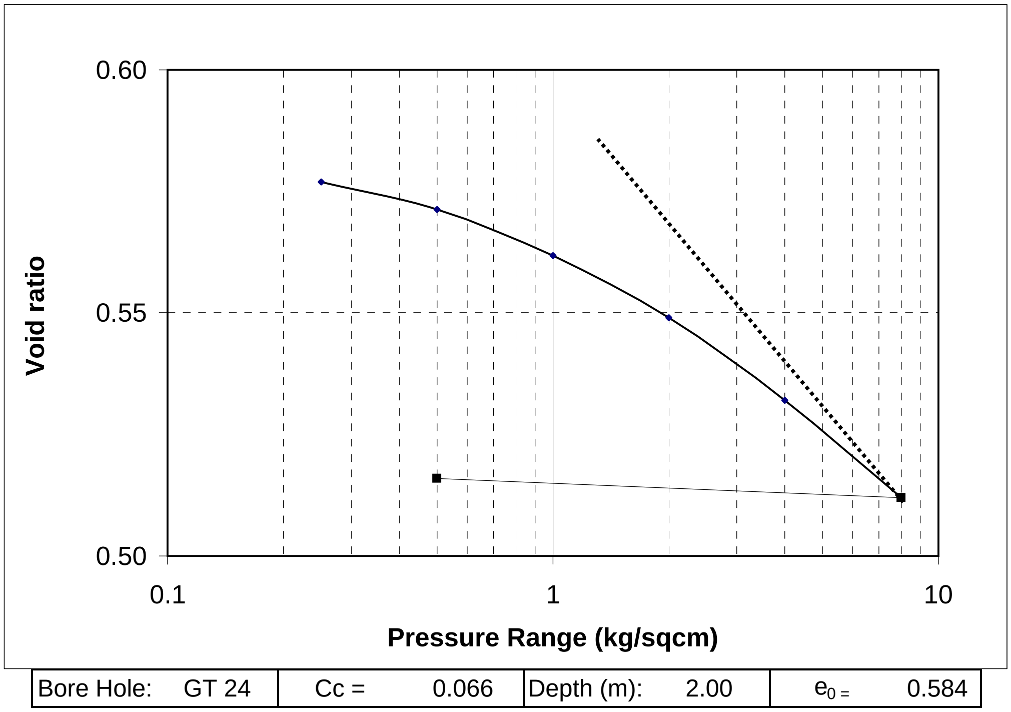
Bore Hole:	GT 22	Cc =	0.100	Depth (m):	4.00	e_{0} =	0.667



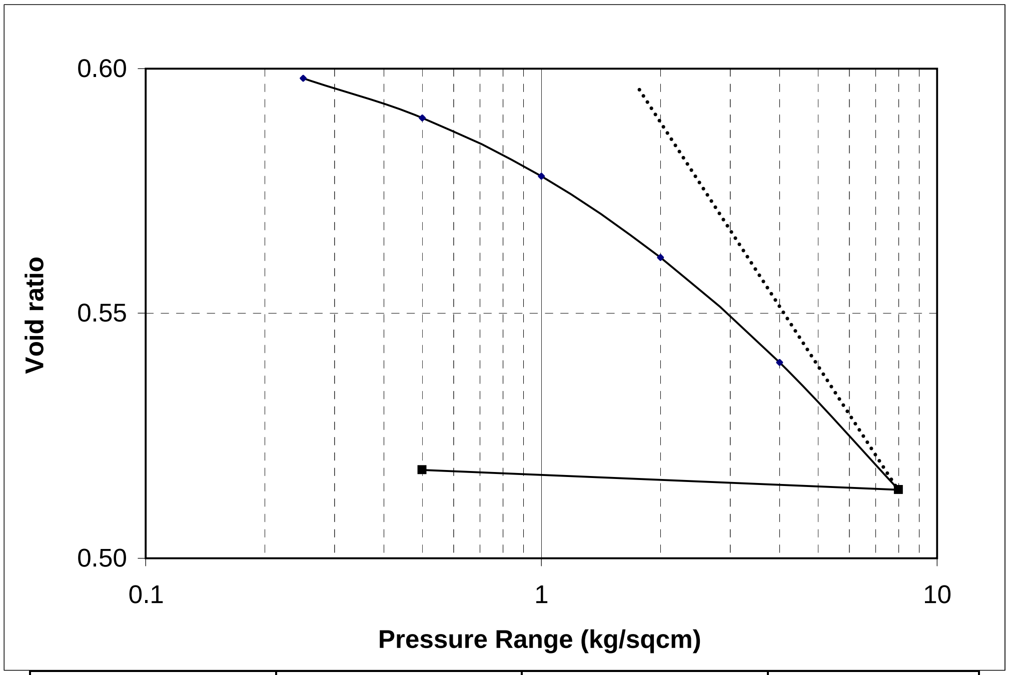
Bore Hole:	GT 23	Cc =	0.106	Depth (m):	6.00	e_{0} =	0.689

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

e-logp curve



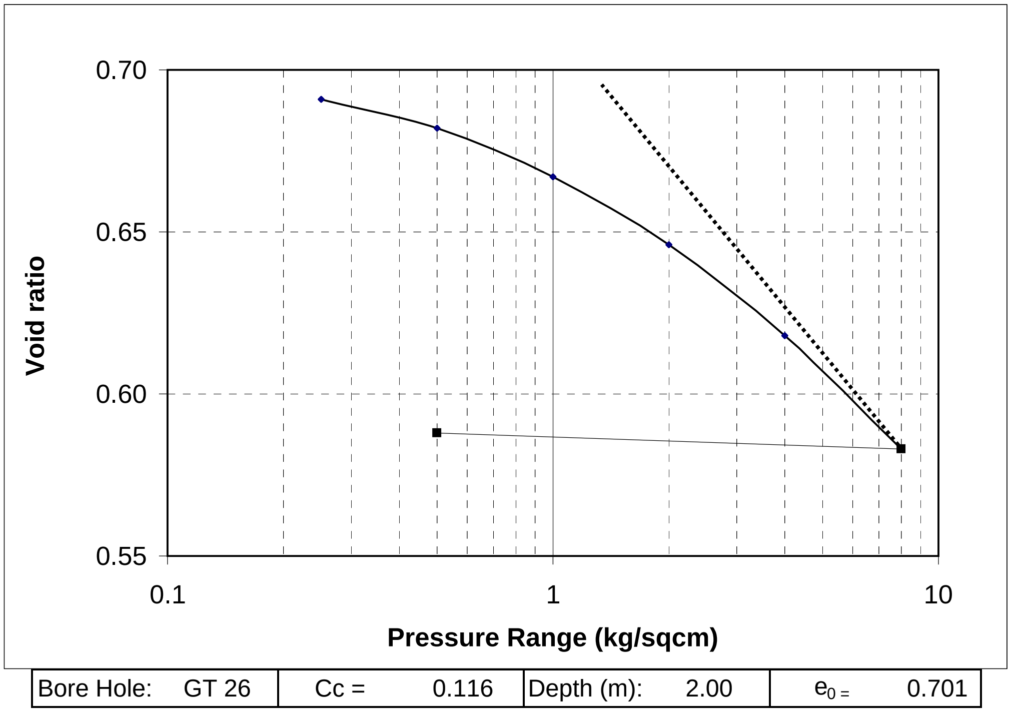
Bore Hole:	GT 24	Cc =	0.066	Depth (m):	2.00	$e_{0} =$	0.584



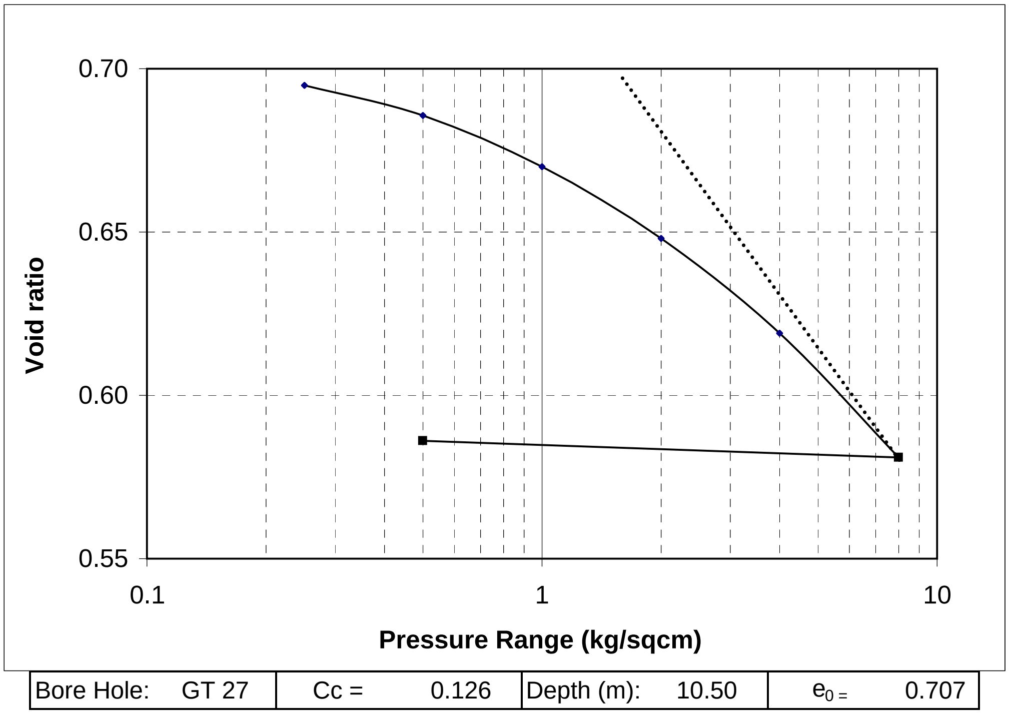
Bore Hole:	GT 25	Cc =	0.086	Depth (m):	5.00	$e_{0} =$	0.608

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

e-logp curve



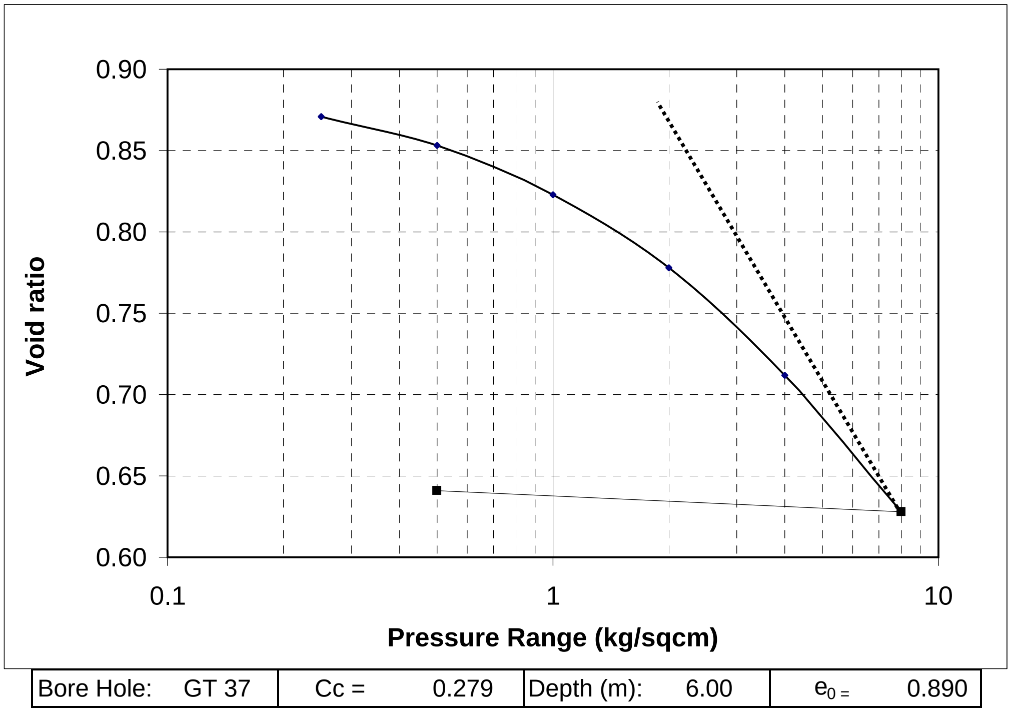
Bore Hole:	GT 26	Cc =	0.116	Depth (m):	2.00	$e_{0} =$	0.701



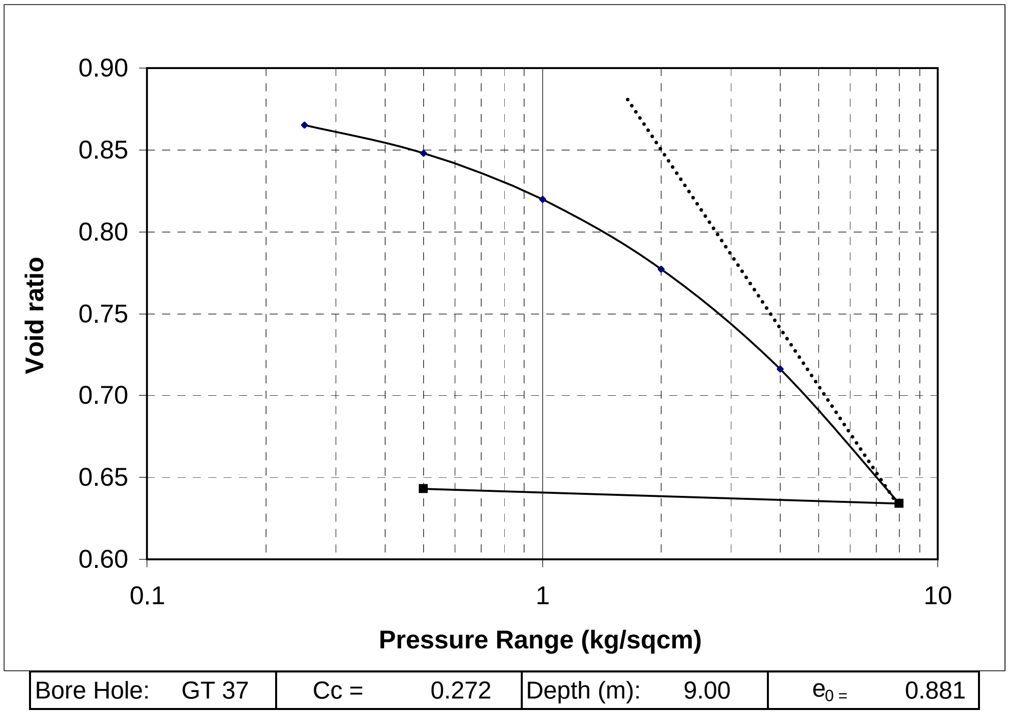
Bore Hole:	GT 27	Cc =	0.126	Depth (m):	10.50	$e_{0} =$	0.707

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

e-logp curve



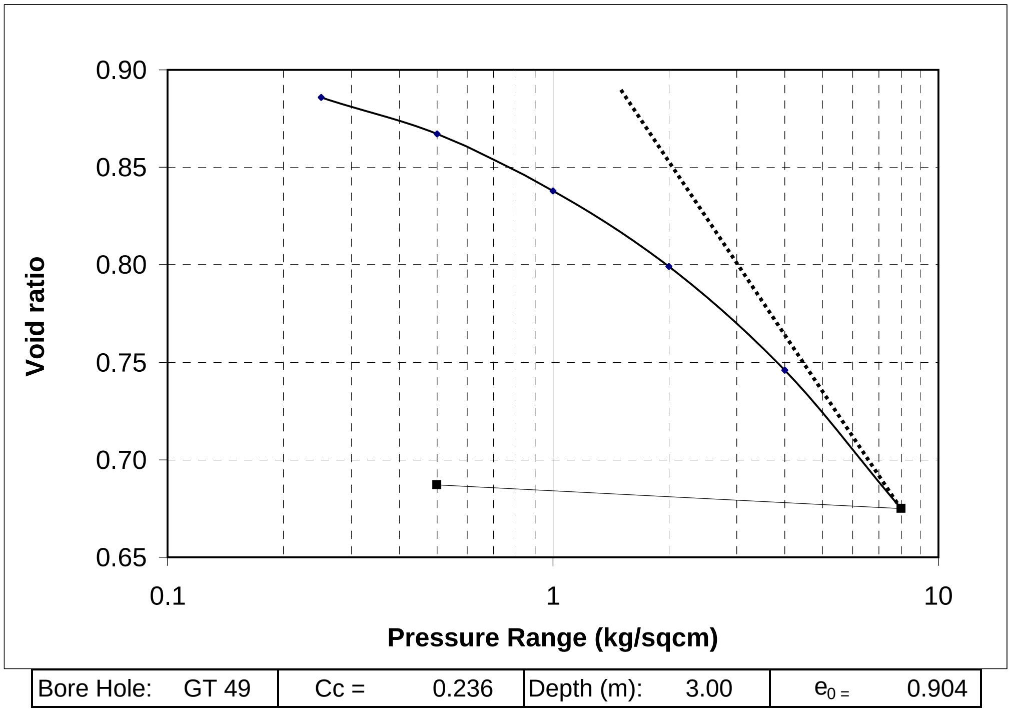
Bore Hole:	GT 37	Cc =	0.279	Depth (m):	6.00	e_{0} =	0.890



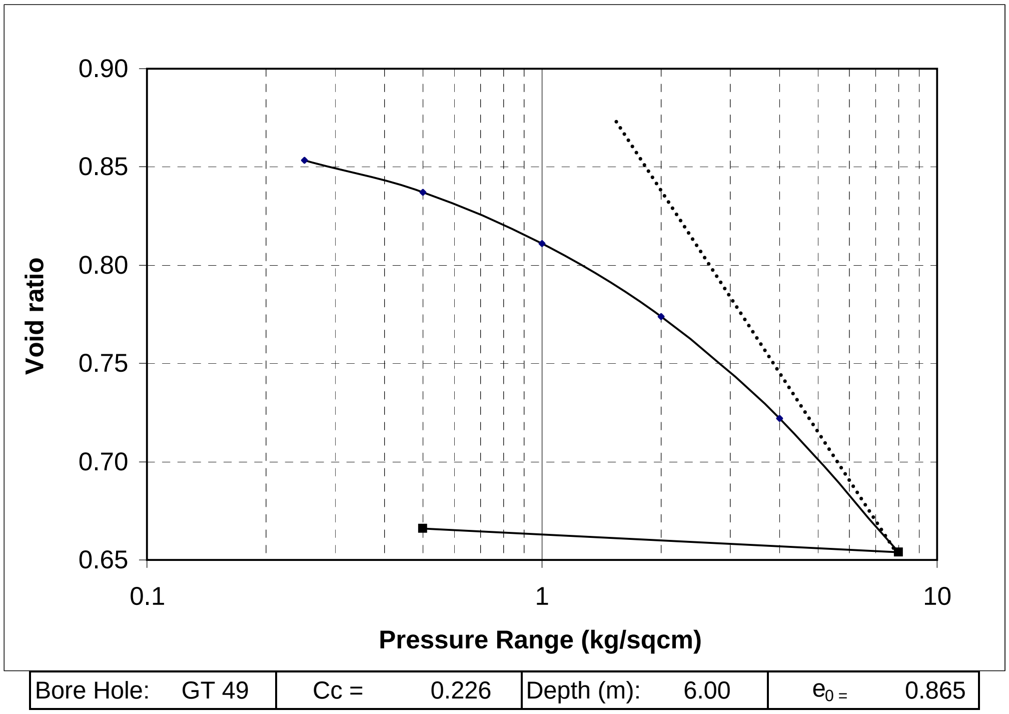
Bore Hole:	GT 37	Cc =	0.272	Depth (m):	9.00	e_{0} =	0.881

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

e-logp curve



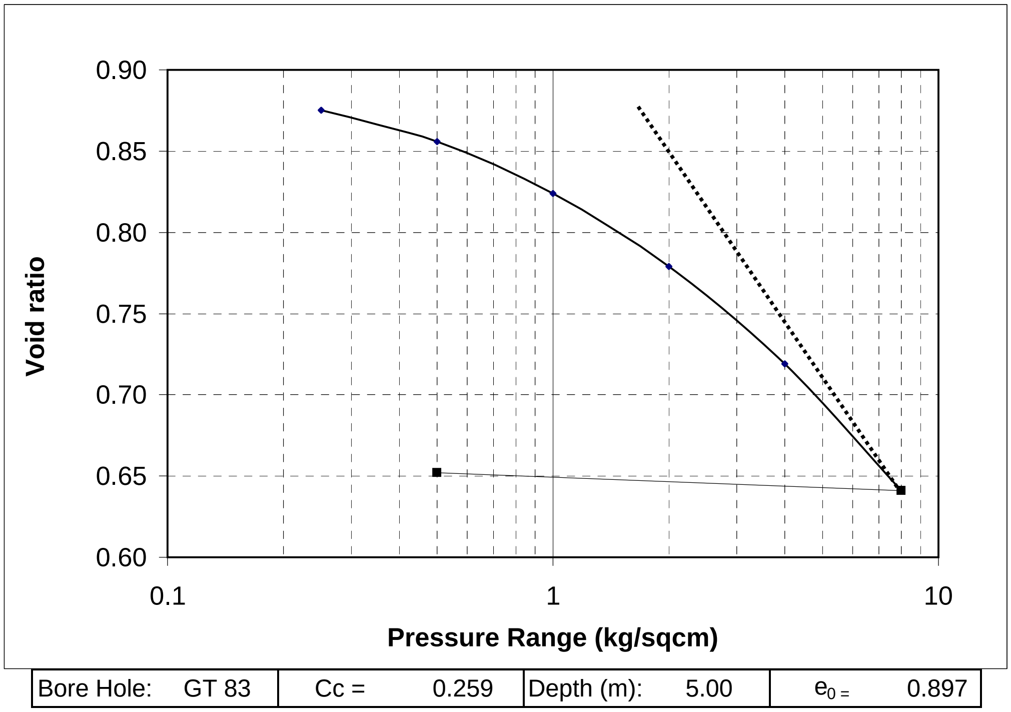
Bore Hole:	GT 49	Cc =	0.236	Depth (m):	3.00	$e_{0} =$	0.904



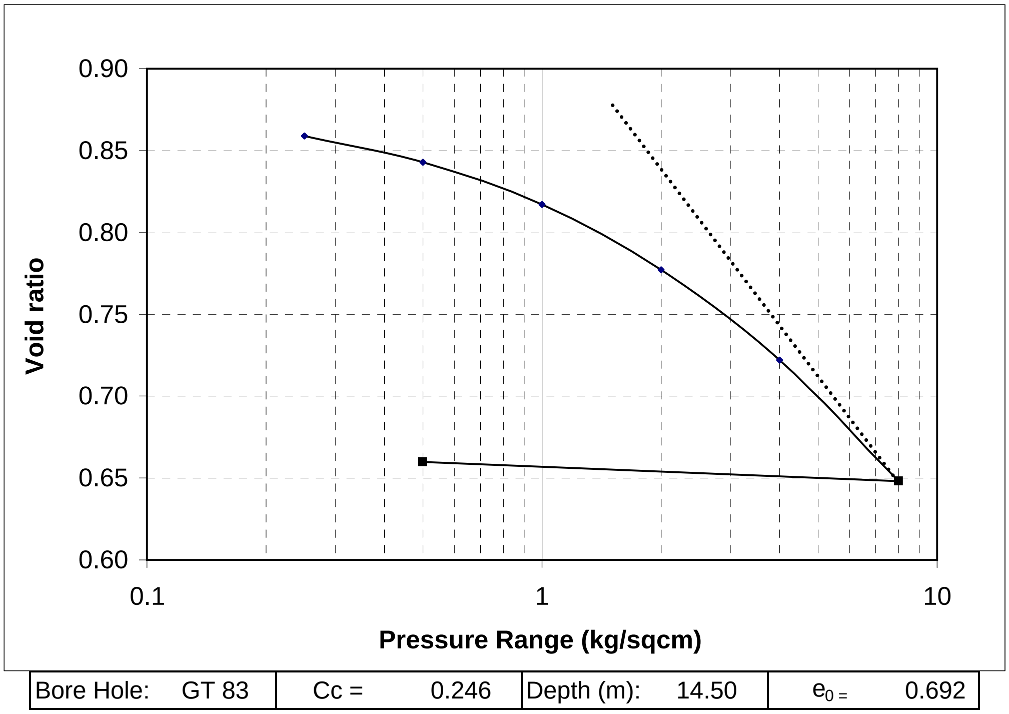
Bore Hole:	GT 49	Cc =	0.226	Depth (m):	6.00	$e_{0} =$	0.865

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

e-logp curve



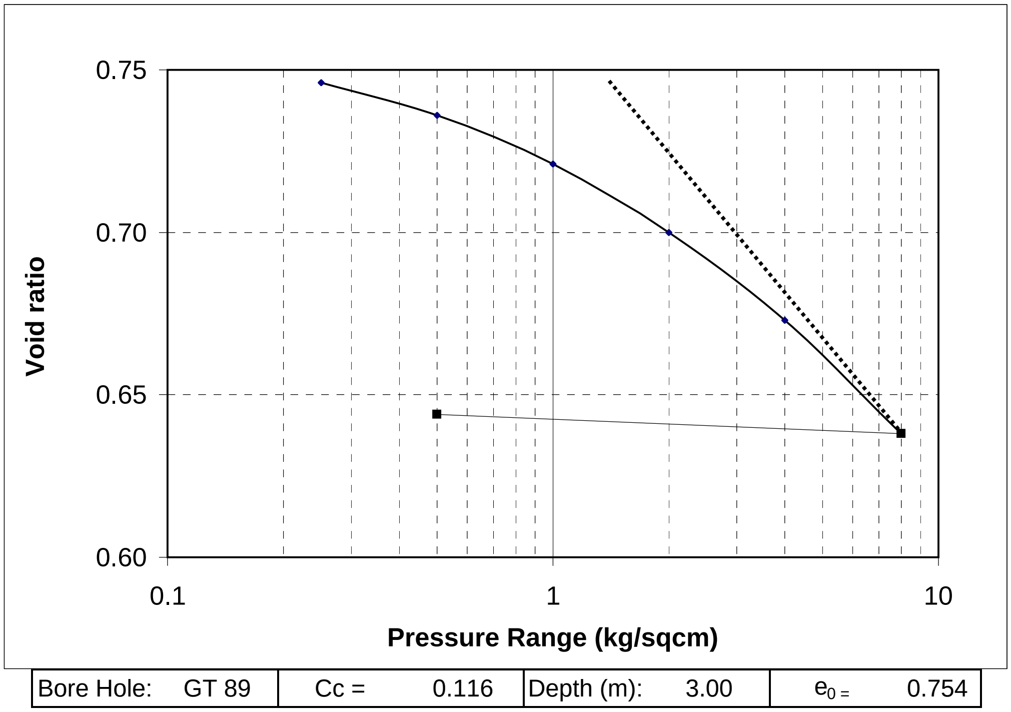
Bore Hole:	GT 83	Cc =	0.259	Depth (m):	5.00	e_{0} =	0.897



Bore Hole:	GT 83	Cc =	0.246	Depth (m):	14.50	e_{0} =	0.692

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

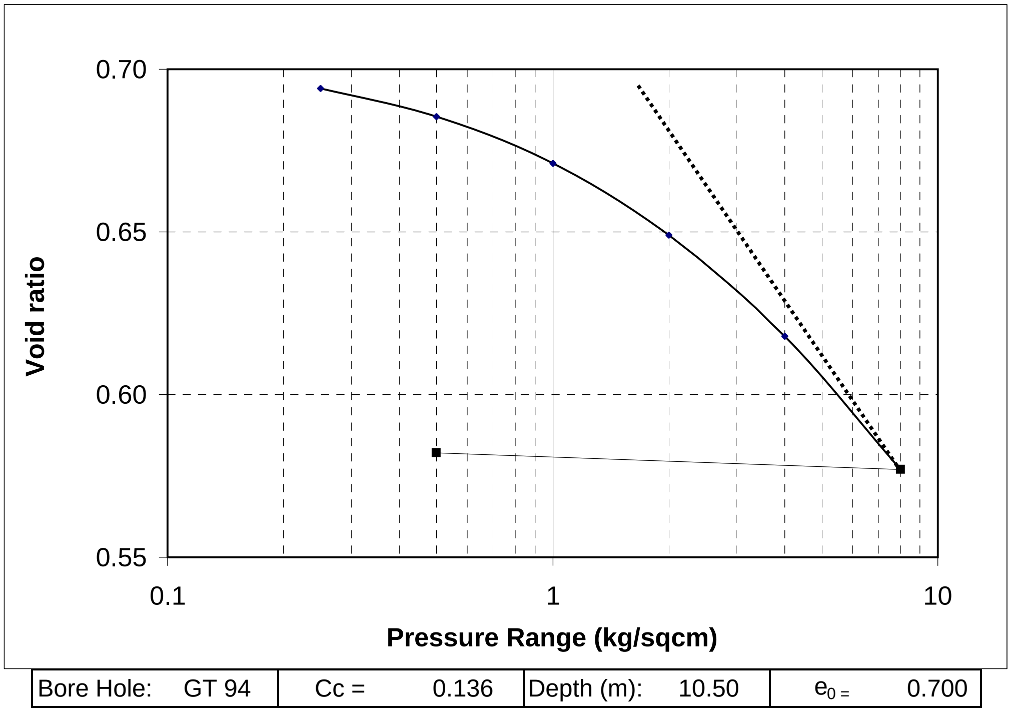
e-logp curve



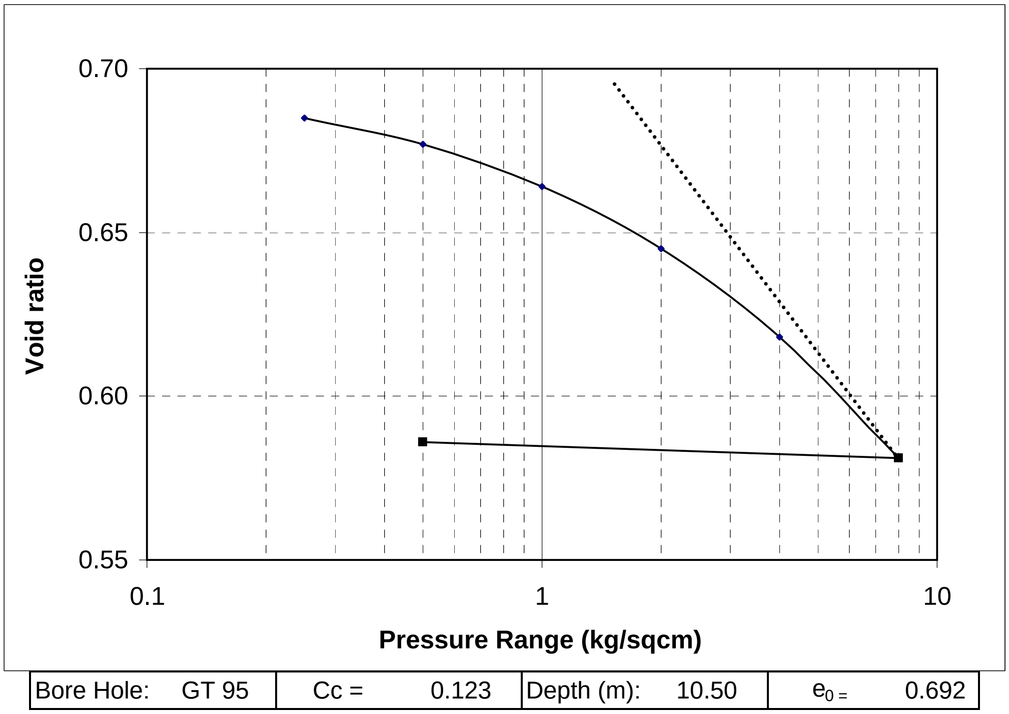
Bore Hole:	GT 89	Cc =	0.116	Depth (m):	3.00	e_{0} =	0.754

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

e-logp curve



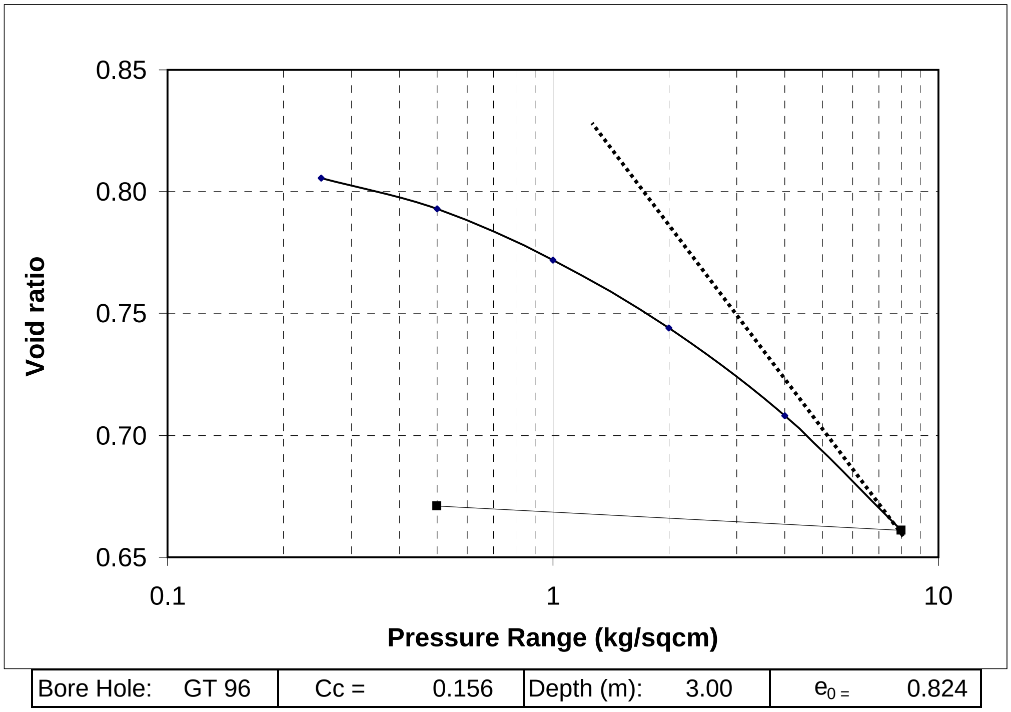
Bore Hole:	GT 94	Cc =	0.136	Depth (m):	10.50	e_{0} =	0.700



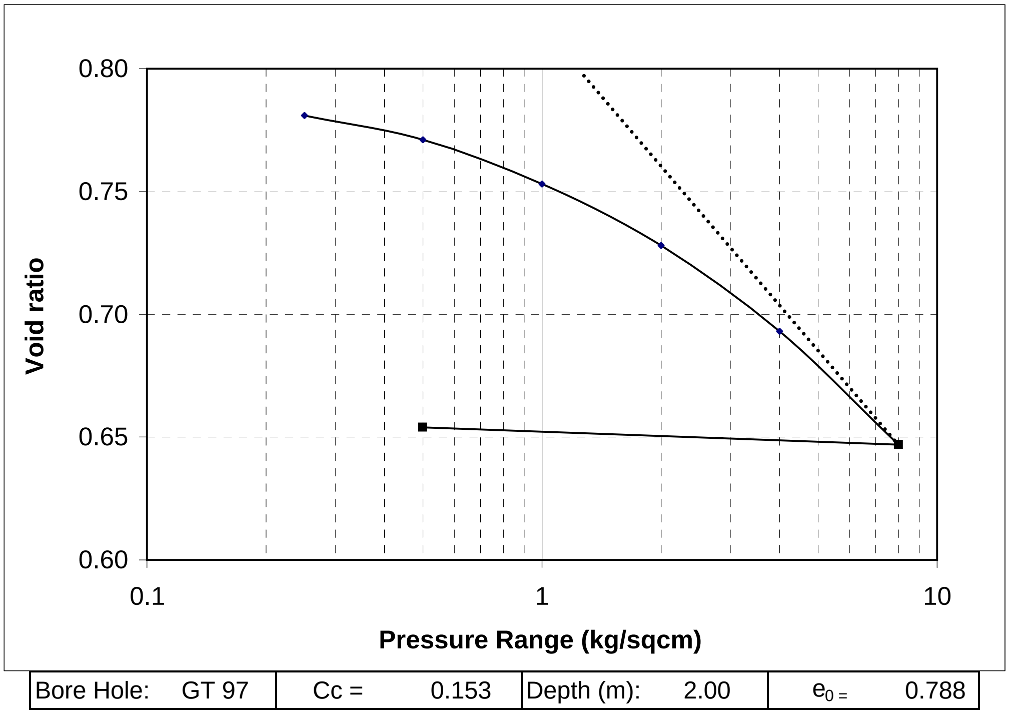
Bore Hole:	GT 95	Cc =	0.123	Depth (m):	10.50	e_{0} =	0.692

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

e-logp curve



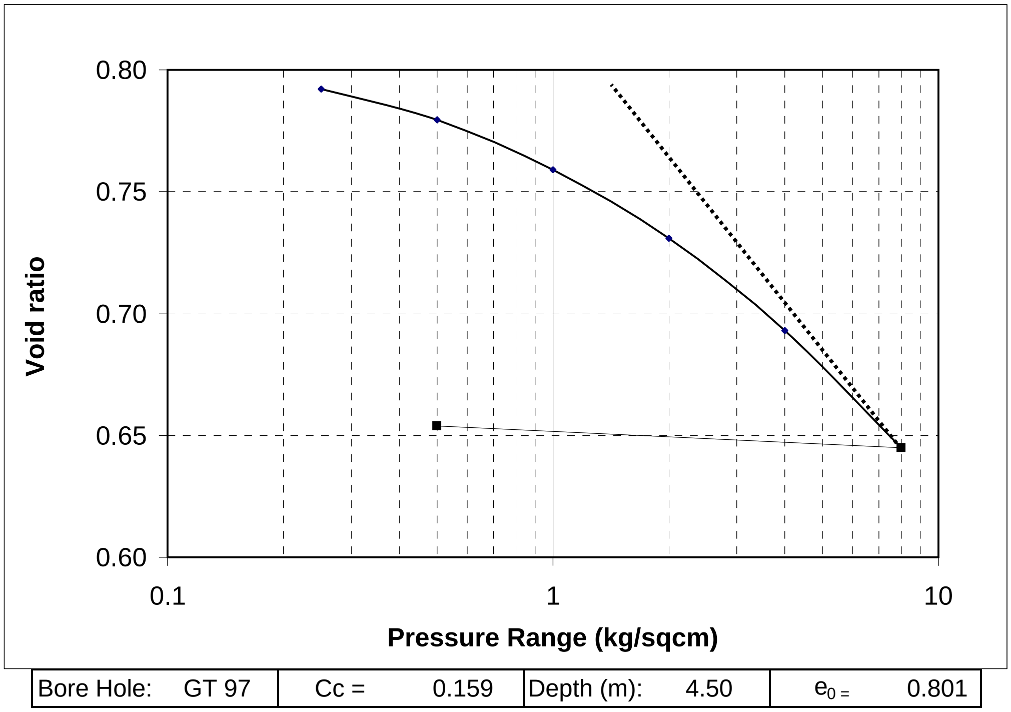
Bore Hole:	GT 96	Cc =	0.156	Depth (m):	3.00	e_{0} =	0.824



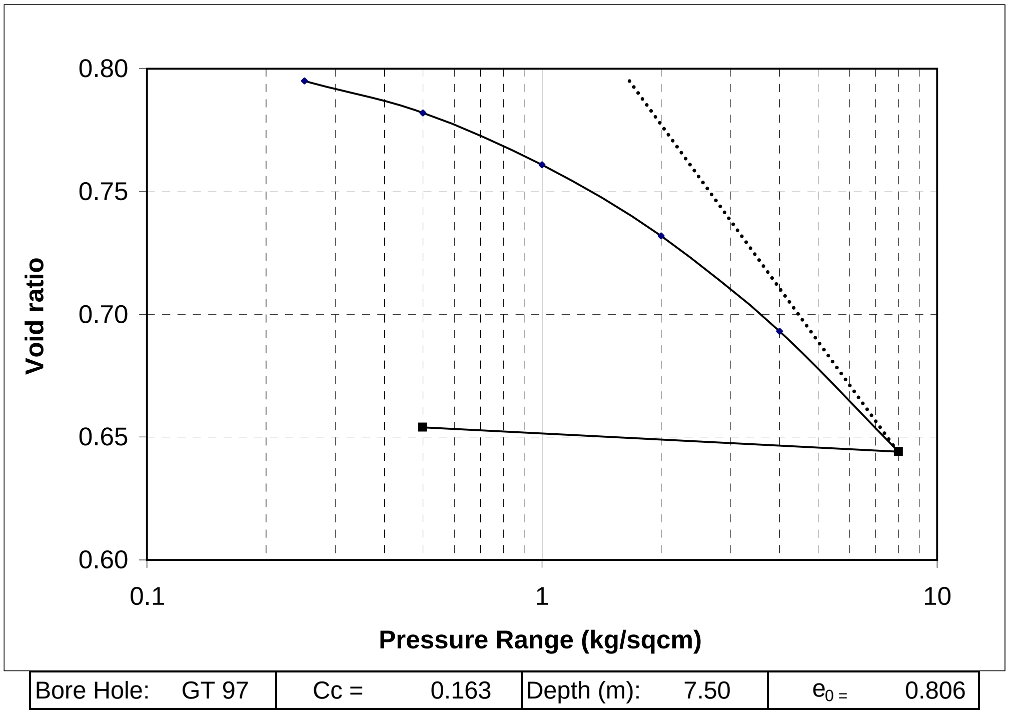
Bore Hole:	GT 97	Cc =	0.153	Depth (m):	2.00	e_{0} =	0.788

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

e-logp curve



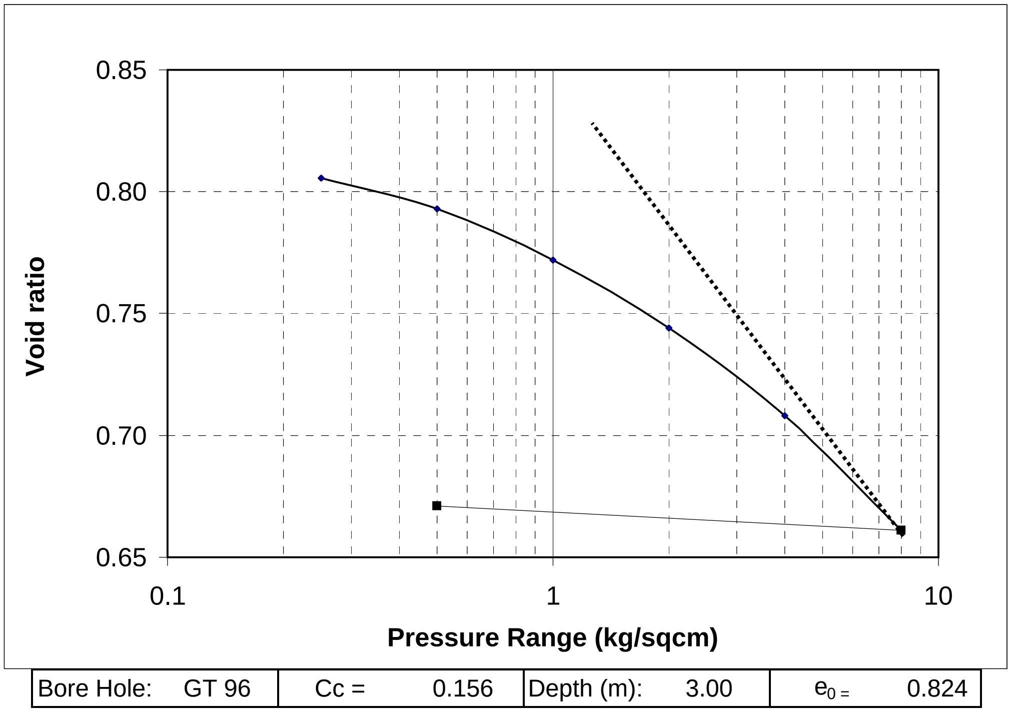
Bore Hole:	GT 97	Cc =	0.159	Depth (m):	4.50	$e_0 =$	0.801



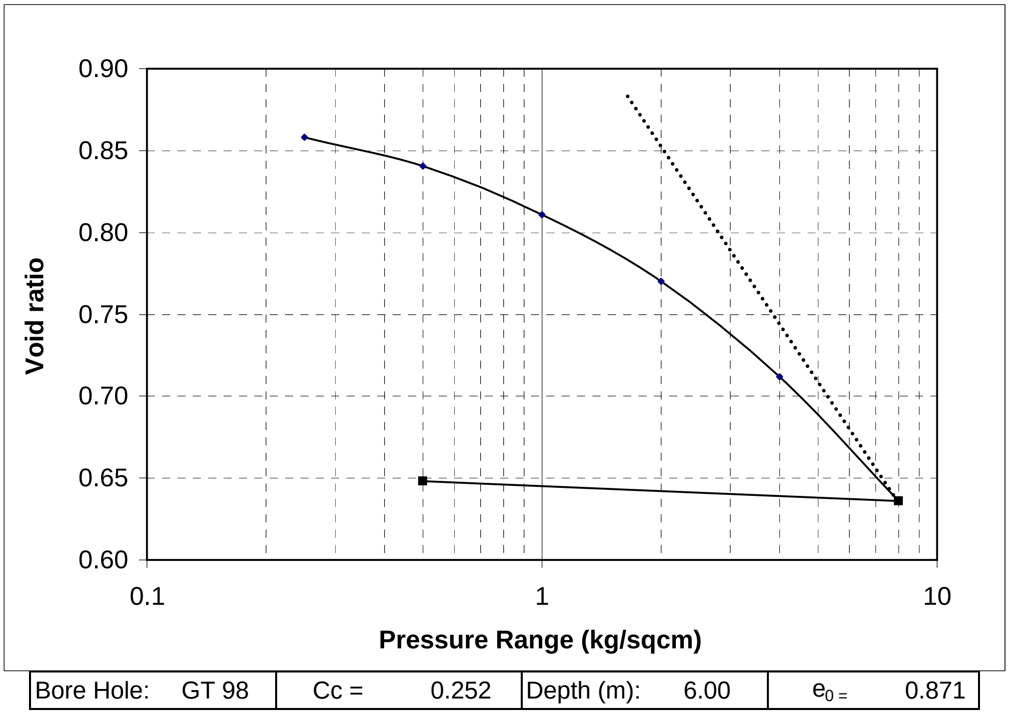
Bore Hole:	GT 97	Cc =	0.163	Depth (m):	7.50	$e_0 =$	0.806

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

e-logp curve



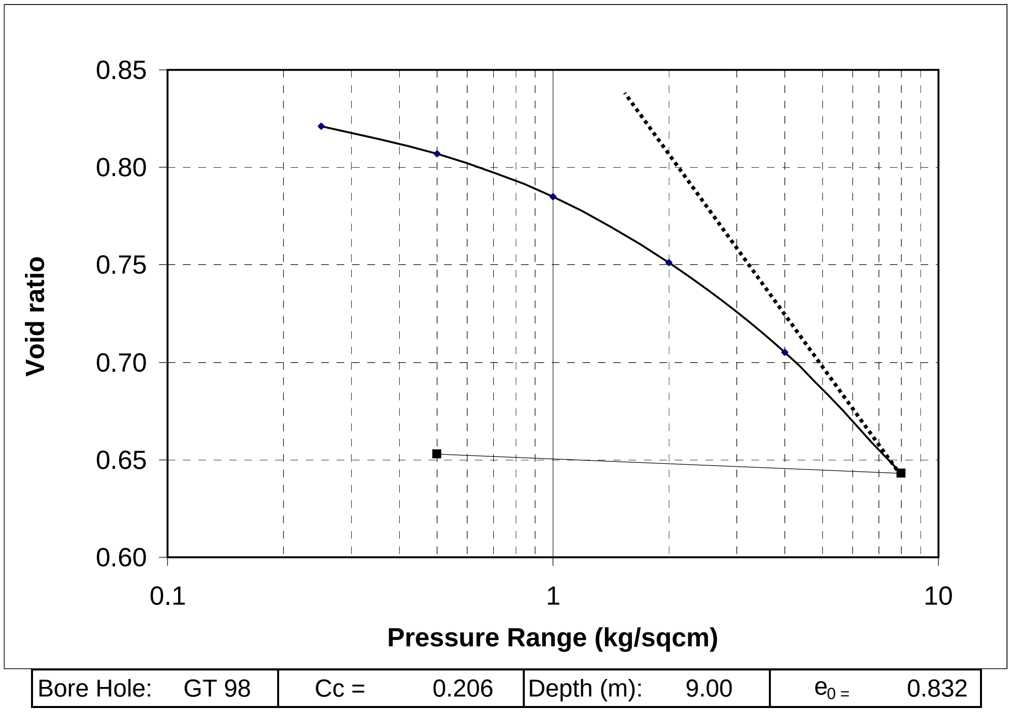
Bore Hole: GT 96	Cc = 0.156	Depth (m): 3.00	e_0 = 0.824



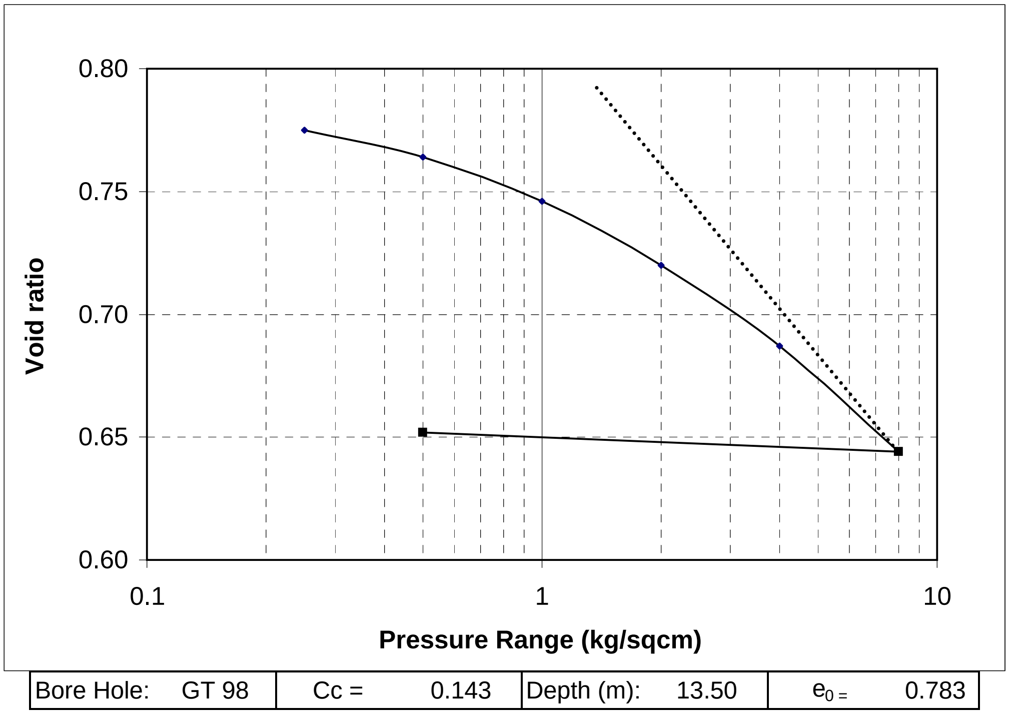
Bore Hole: GT 98	Cc = 0.252	Depth (m): 6.00	e_0 = 0.871

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

e-logp curve



Bore Hole:	GT 98	Cc =	0.206	Depth (m):	9.00	e_{0} =	0.832

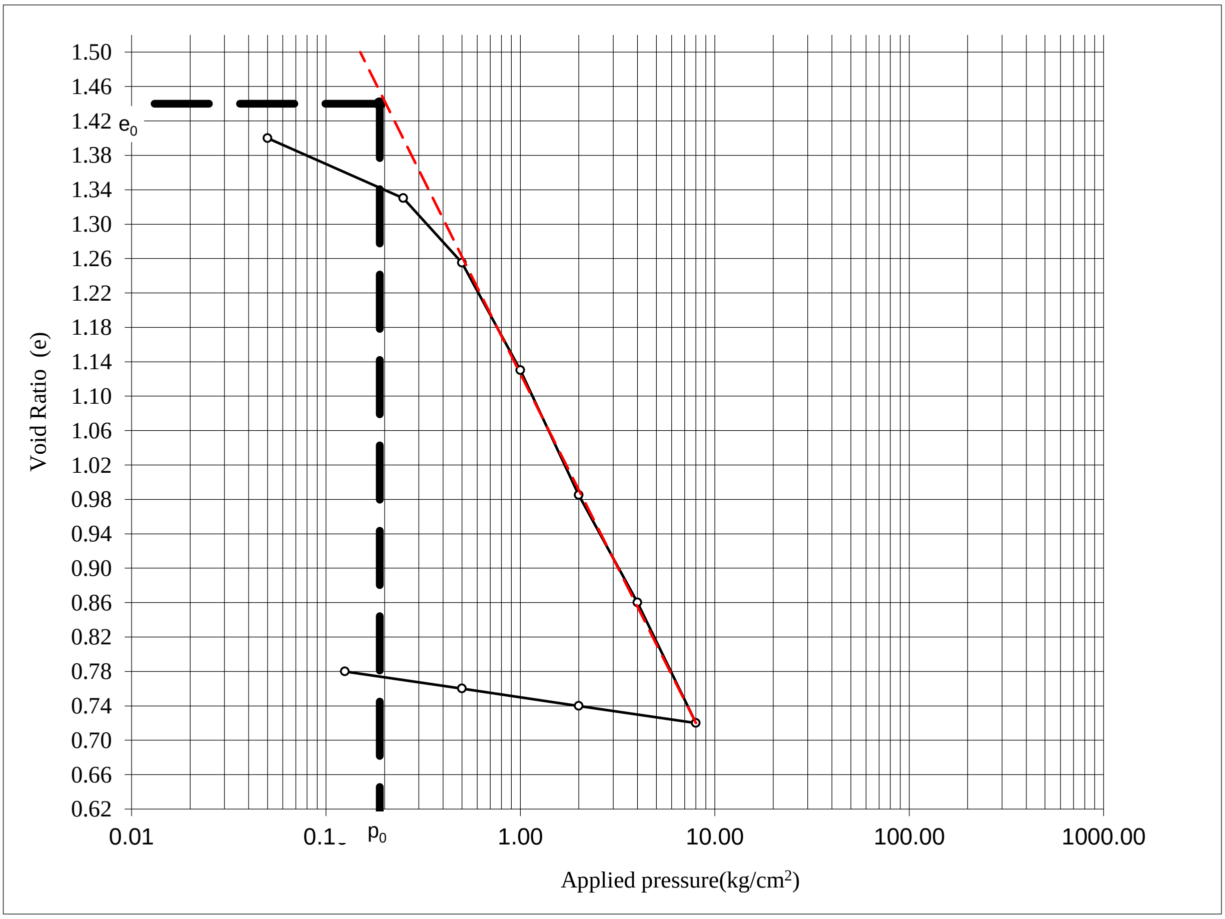


Bore Hole:	GT 98	Cc =	0.143	Depth (m):	13.50	e_{0} =	0.783

Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

e log p curve

BH No : GT50B
Depth(m) 3.50 to 3.95
Compression Index (Cc) : 0.45
Initial void ratio (e0) : 1.44

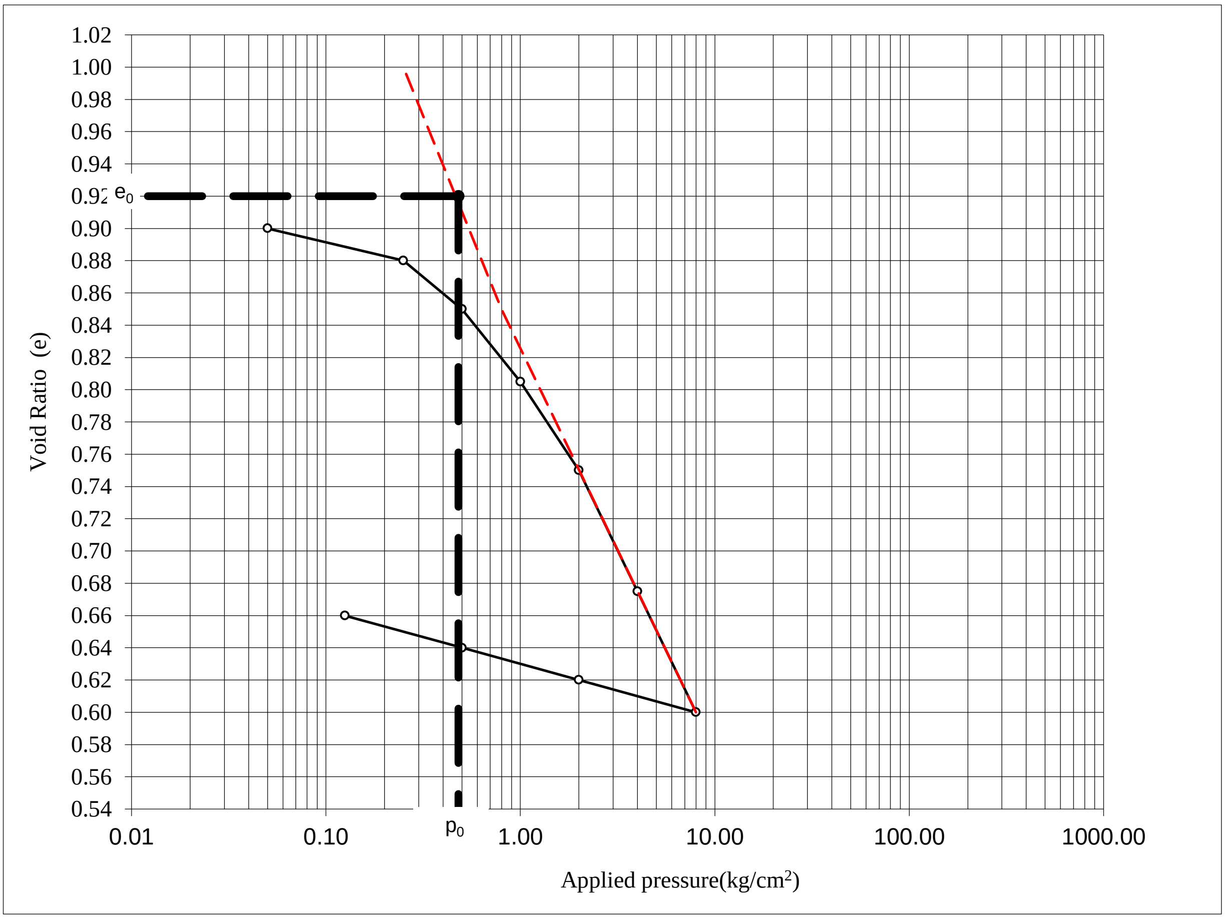


PRESSURE (kg/cm^2)	Mv (cm^2/kg)
0.25-0.50	0.129
0.50-1.0	0.111
1.0-2.0	0.068
2.0-4.0	0.031
4.0-8.0	0.019

Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

e log p curve

BH No : GT51A
Depth(m) 6.00 to 6.45
Compression Index (Cc) : 0.25
Initial void ratio (e0) : 0.92

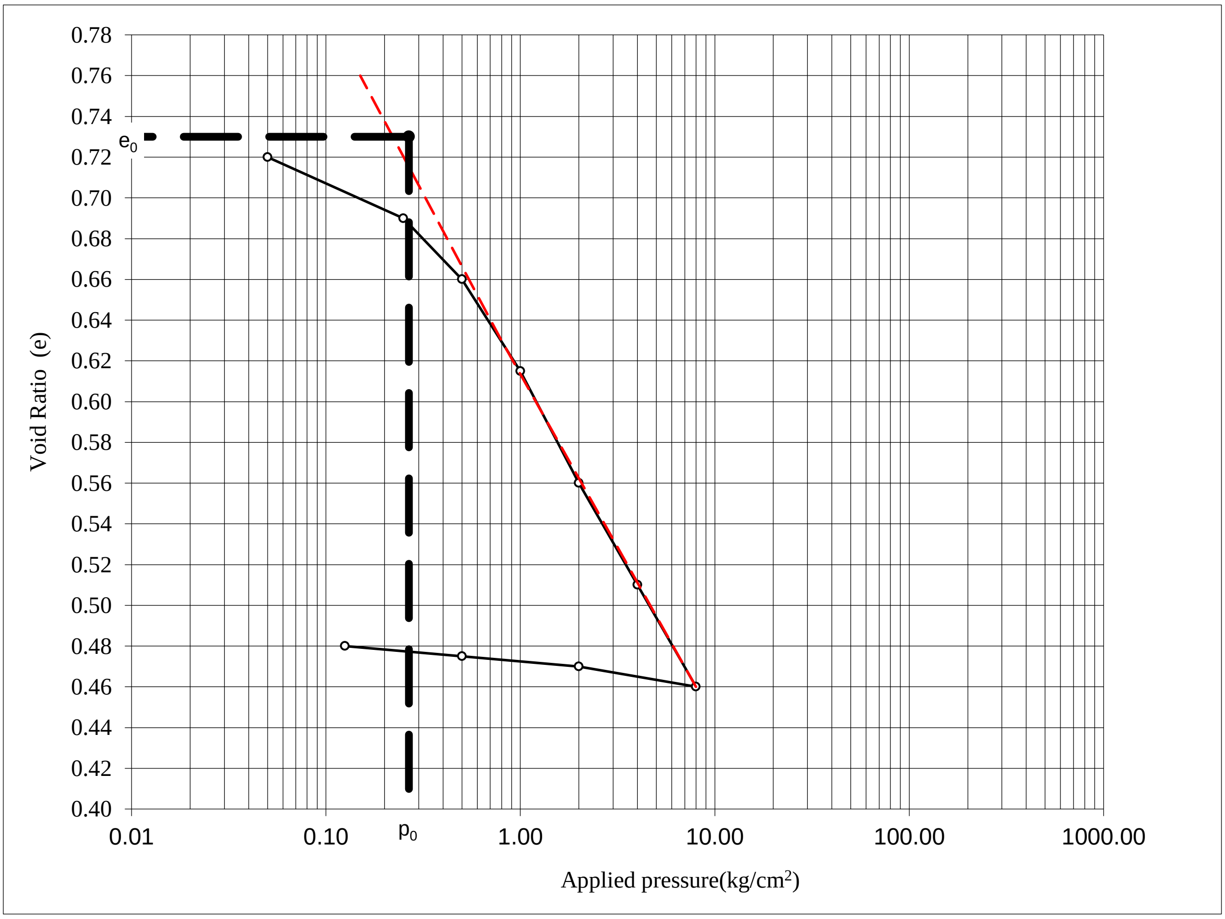


PRESSURE (kg/cm^2)	Mv (cm^2/kg)
0.25-0.50	0.064
0.50-1.0	0.049
1.0-2.0	0.030
2.0-4.0	0.021
4.0-8.0	0.011

Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

e log p curve

BH No : GT52A
Depth(m) 3.00 to 3.45
Compression Index (Cc) : 0.17
Initial void ratio (e0) : 0.73

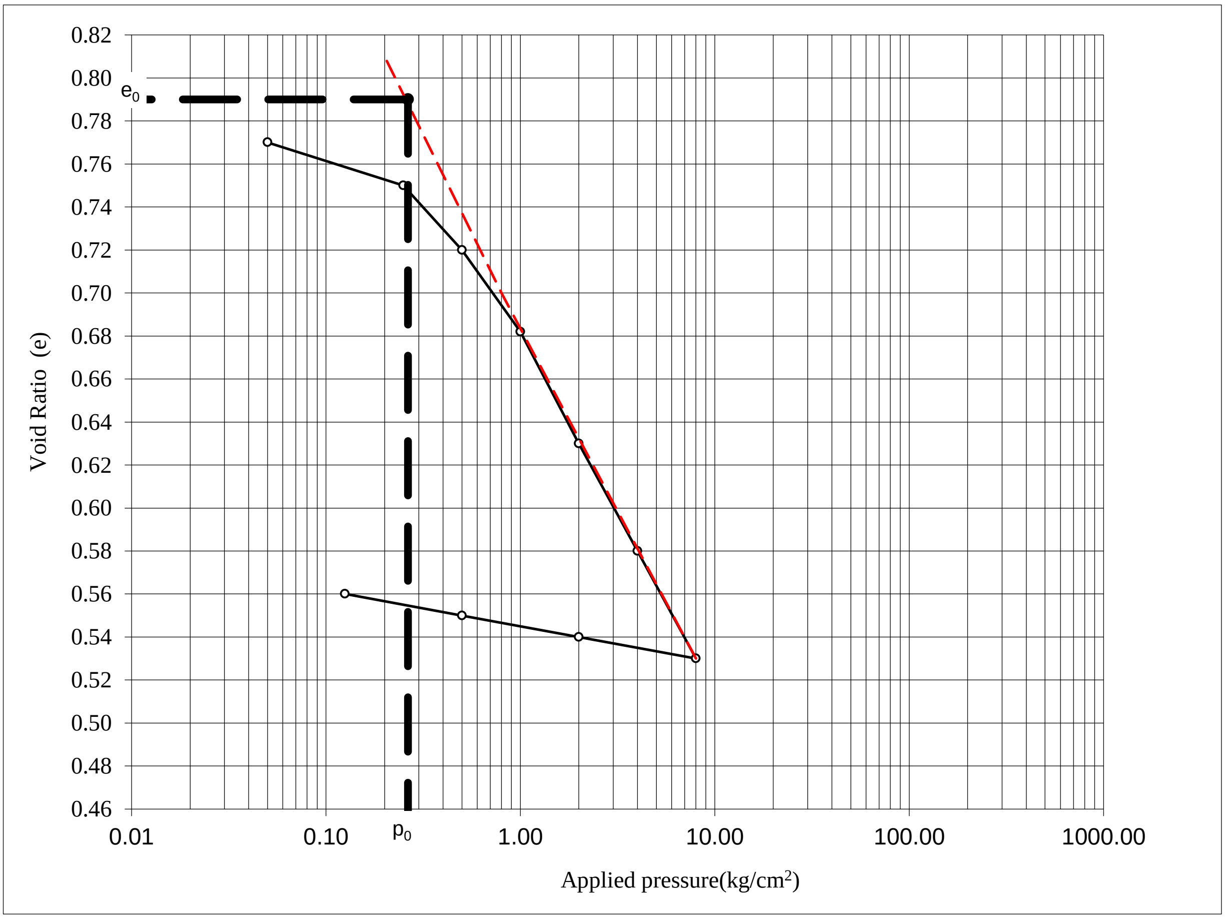


PRESSURE (kg/cm^2)	Mv (cm^2/kg)
0.25-0.50	0.071
0.50-1.0	0.054
1.0-2.0	0.034
2.0-4.0	0.016
4.0-8.0	0.008

Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

e log p curve

BH No : GT 58A
Depth(m) 3.00 to 3.45
Compression Index (Cc) : 0.17
Initial void ratio (e0) : 0.79

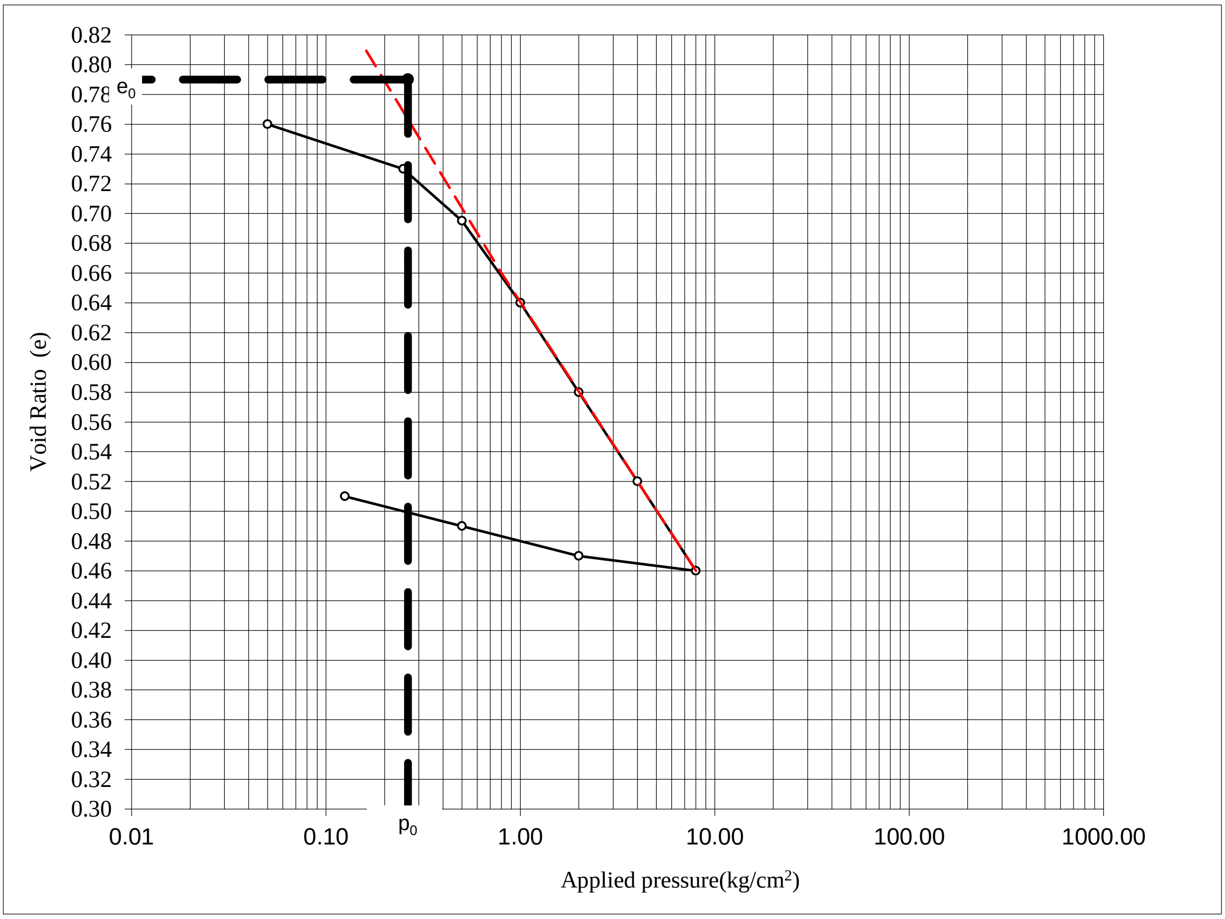


PRESSURE (kg/cm^2)	Mv (cm^2/kg)
0.25-0.50	0.069
0.50-1.0	0.044
1.0-2.0	0.031
2.0-4.0	0.015
4.0-8.0	0.008

Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

e log p curve

BH No	:	GT 55A
Depth(m)	3.00 to	3.45
Compression Index (Cc)	:	0.20
Initial void ratio (e0)	:	0.79

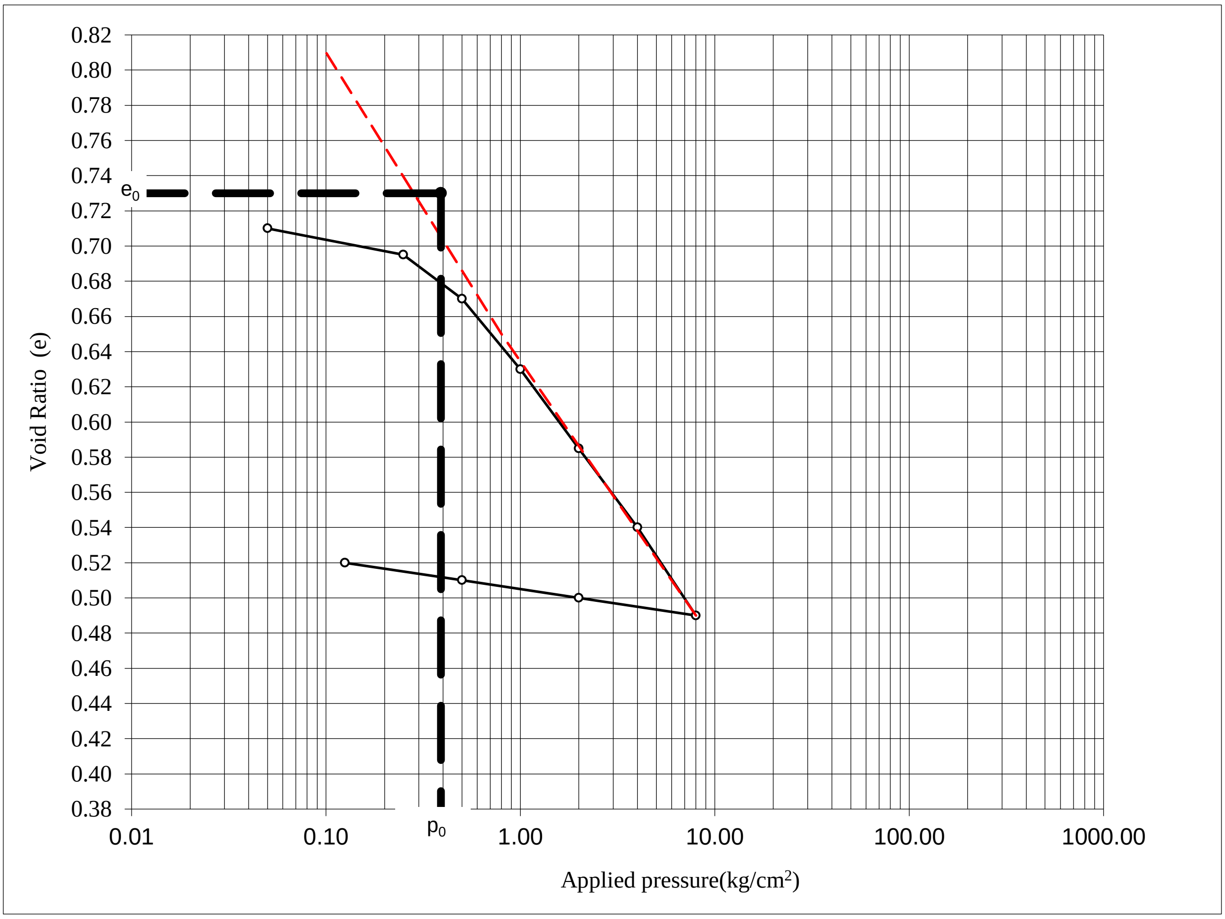


PRESSURE (kg/cm^2)	Mv (cm^2/kg)
0.25-0.50	0.081
0.50-1.0	0.065
1.0-2.0	0.037
2.0-4.0	0.019
4.0-8.0	0.010

Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

e log p curve

BH No : GT 75A
Depth(m) 4.15 to 4.60
Compression Index (Cc) : 0.16
Initial void ratio (e0) : 0.73

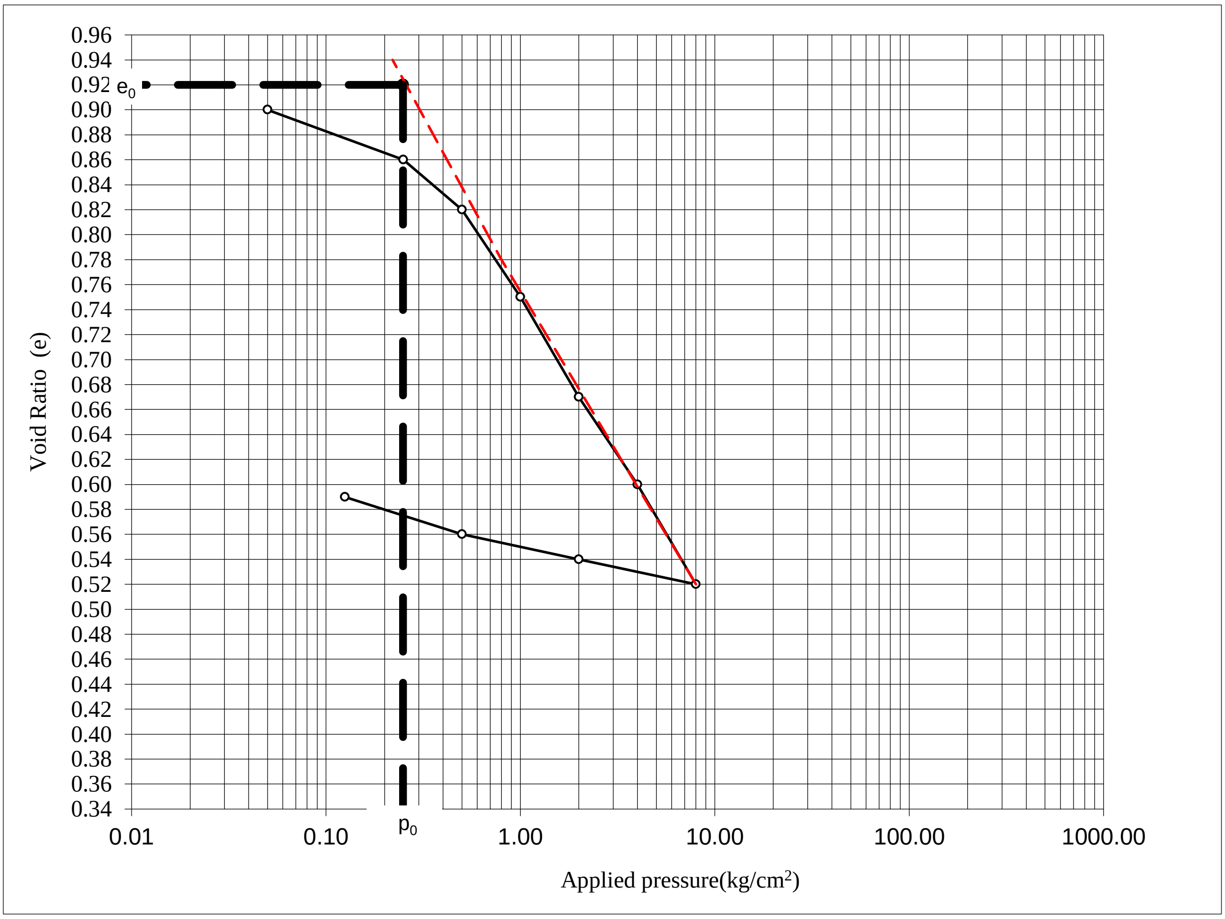


PRESSURE (kg/cm^2)	Mv (cm^2/kg)
0.25-0.50	0.059
0.50-1.0	0.048
1.0-2.0	0.028
2.0-4.0	0.014
4.0-8.0	0.008

Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

e log p curve

BH No : GT 102
Depth(m) 3.00 to 3.45
Compression Index (Cc) : 0.26
Initial void ratio (e0) : 0.92

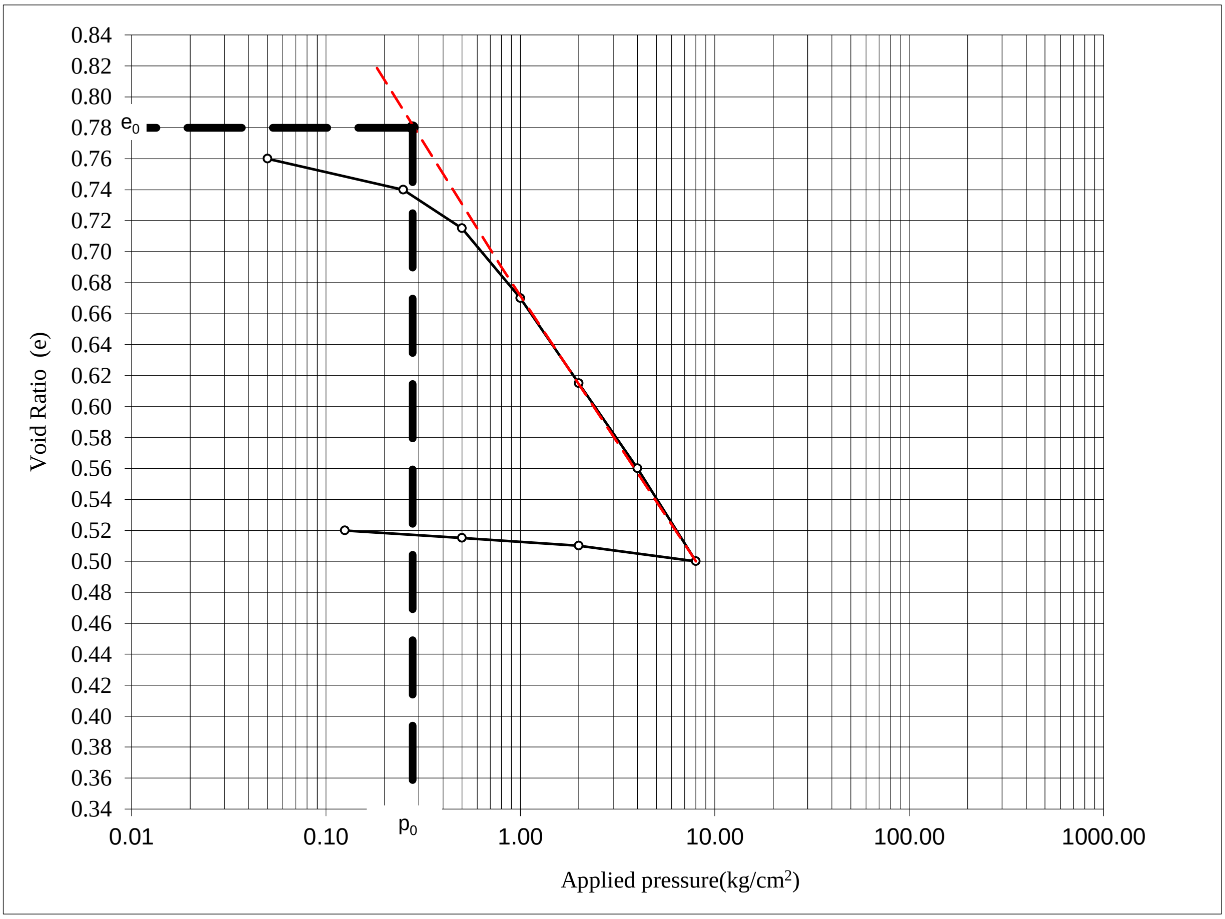


PRESSURE (kg/cm^2)	Mv (cm^2/kg)
0.25-0.50	0.086
0.50-1.0	0.077
1.0-2.0	0.046
2.0-4.0	0.021
4.0-8.0	0.013

Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

e log p curve

BH No : GT 103
Depth(m) 3.00 to 3.45
Compression Index (Cc) : 0.19
Initial void ratio (e0) : 0.78

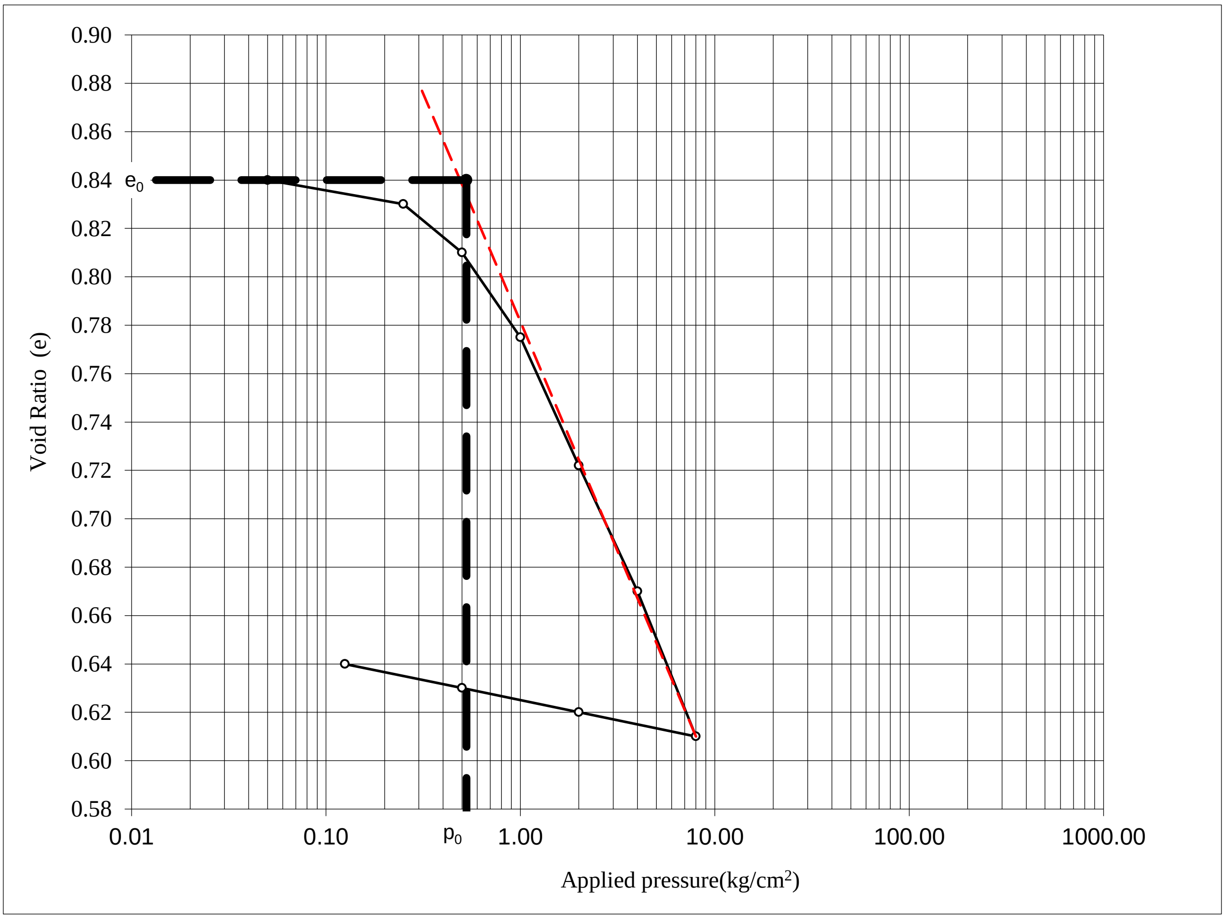


PRESSURE (kg/cm^2)	Mv (cm^2/kg)
0.25-0.50	0.057
0.50-1.0	0.052
1.0-2.0	0.033
2.0-4.0	0.017
4.0-8.0	0.010

Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

e log p curve

BH No	: GT 109
Depth(m)	6.00 to 6.45
Compression Index (Cc)	: 0.19
Initial void ratio (e0)	: 0.84

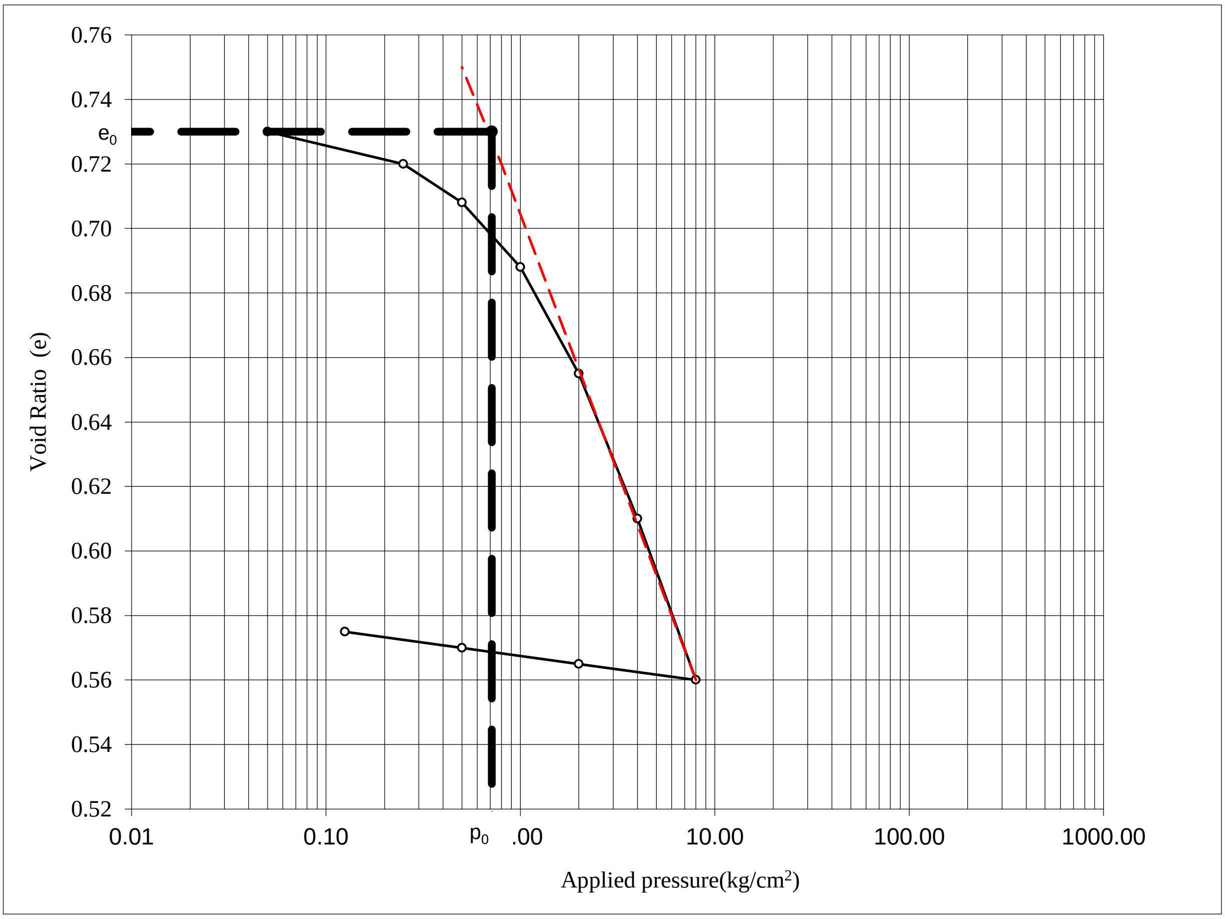


PRESSURE (kg/cm^2)	Mv (cm^2/kg)
0.25-0.50	0.044
0.50-1.0	0.039
1.0-2.0	0.030
2.0-4.0	0.015
4.0-8.0	0.009

Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

e log p curve

BH No : GT 113
Depth(m) 7.50 to 7.95
Compression Index (Cc) : 0.16
Initial void ratio (e0) : 0.73

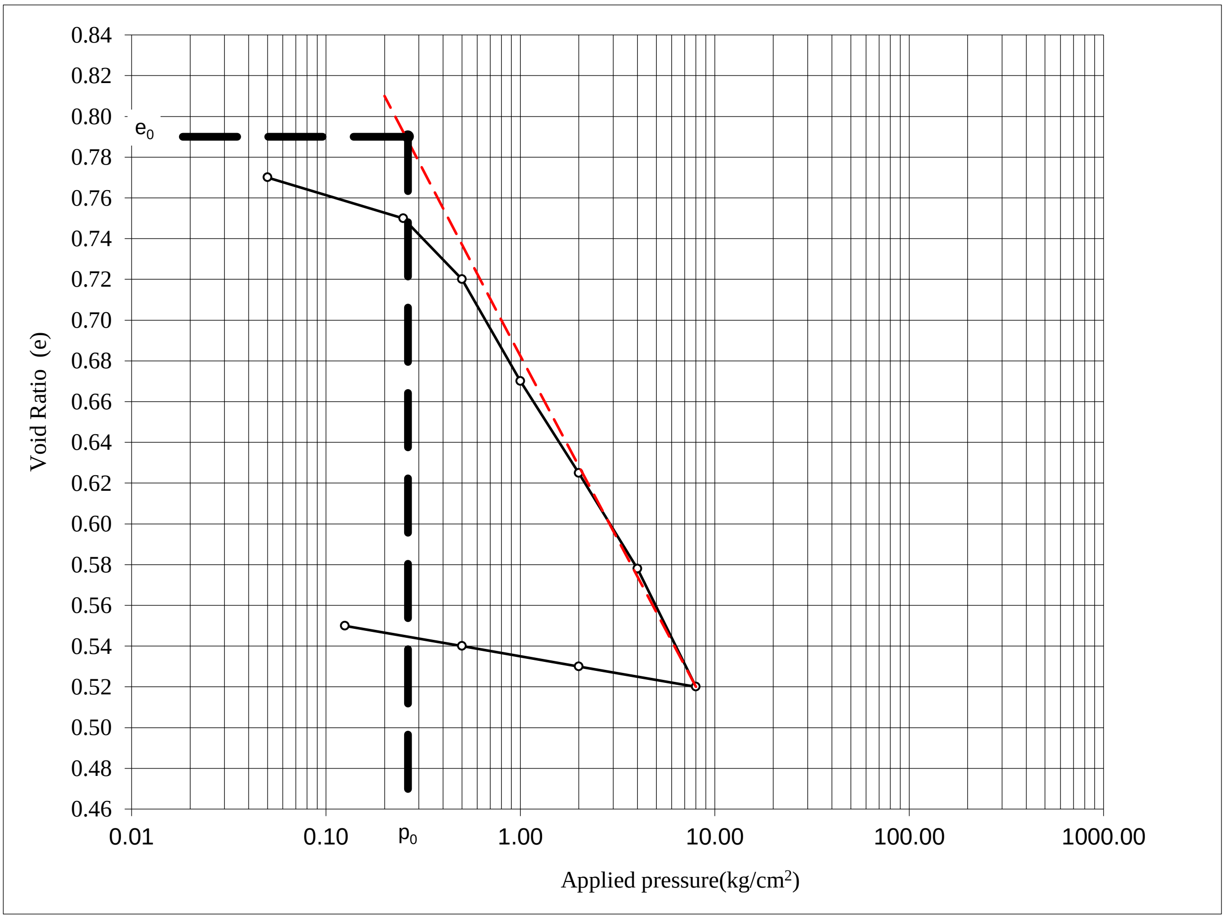


PRESSURE (kg/cm^2)	Mv (cm^2/kg)
0.25-0.50	0.028
0.50-1.0	0.023
1.0-2.0	0.020
2.0-4.0	0.014
4.0-8.0	0.008

Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor

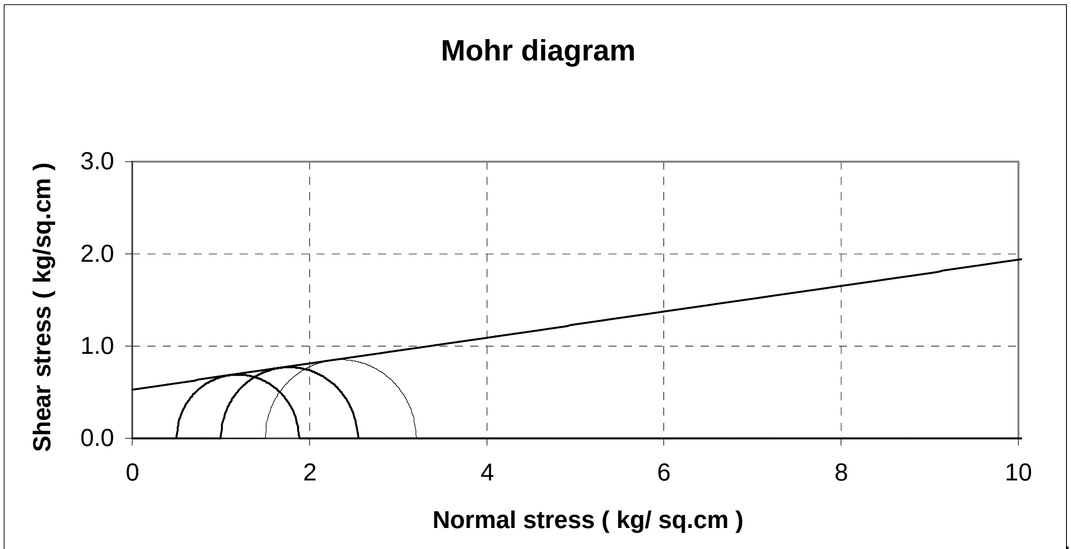
e log p curve

BH No	:	GT 118
Depth(m)	3.00 to	3.45
Compression Index (Cc)	:	0.18
Initial void ratio (e0)	:	0.79

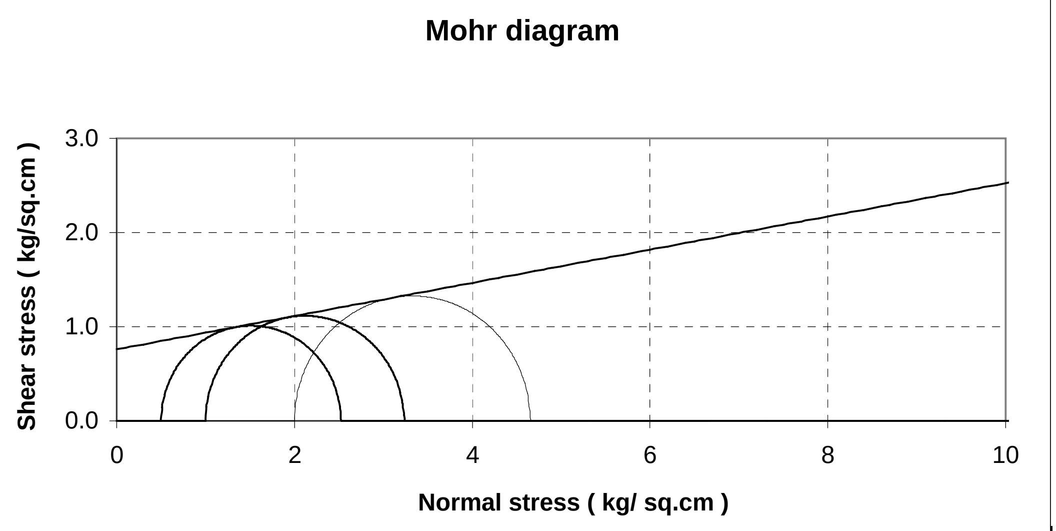


PRESSURE (kg/cm^2)	Mv (cm^2/kg)
0.25-0.50	0.069
0.50-1.0	0.058
1.0-2.0	0.027
2.0-4.0	0.014
4.0-8.0	0.009

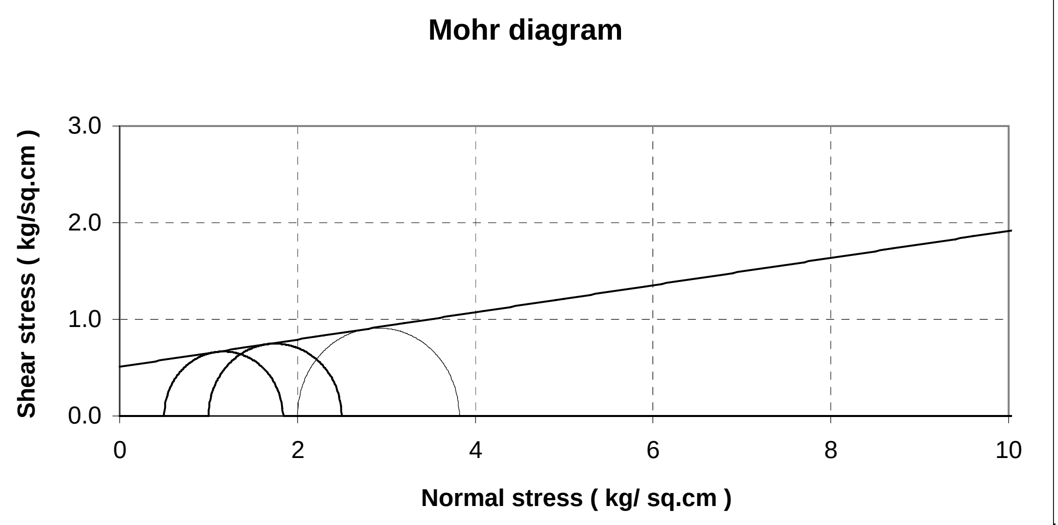
Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.



BH-	GT 07	Depth (m)	3.00	C (kg/cm^2)=	0.53	ϕ (degree) =	8

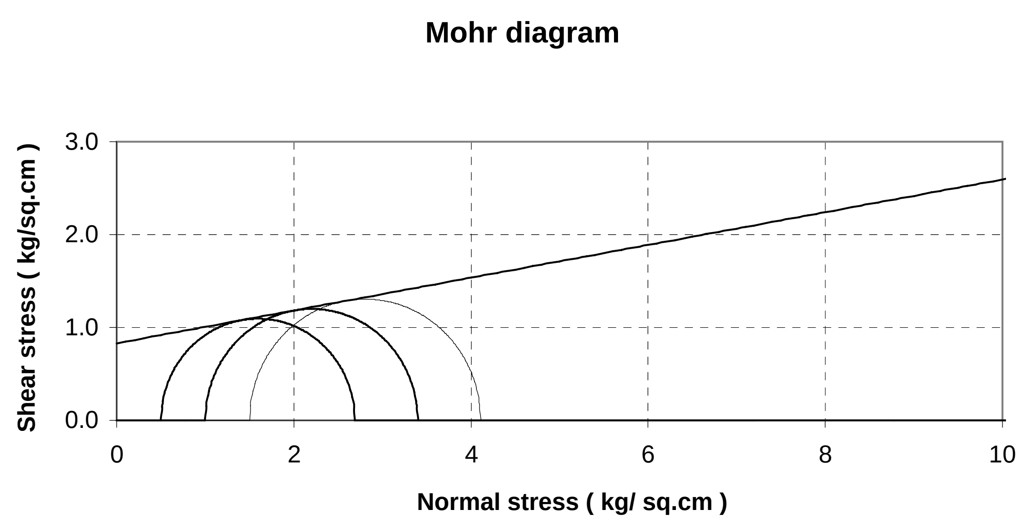


BH-	GT 07	Depth (m)	6.00	C (kg/cm^2)=	0.76	ϕ (degree) =	10

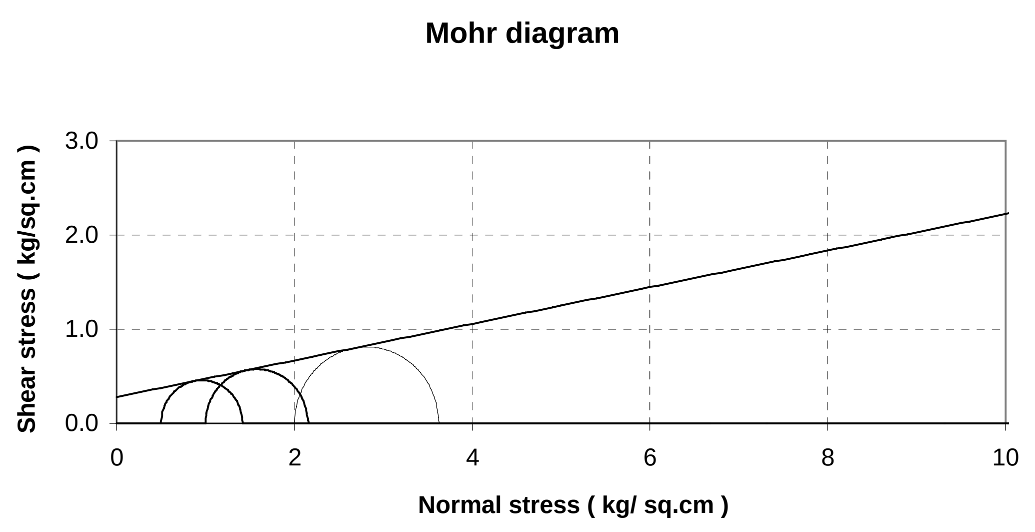


BH-	GT 10	Depth (m)	3.00	C (kg/cm^2)=	0.51	ϕ (degree) =	8

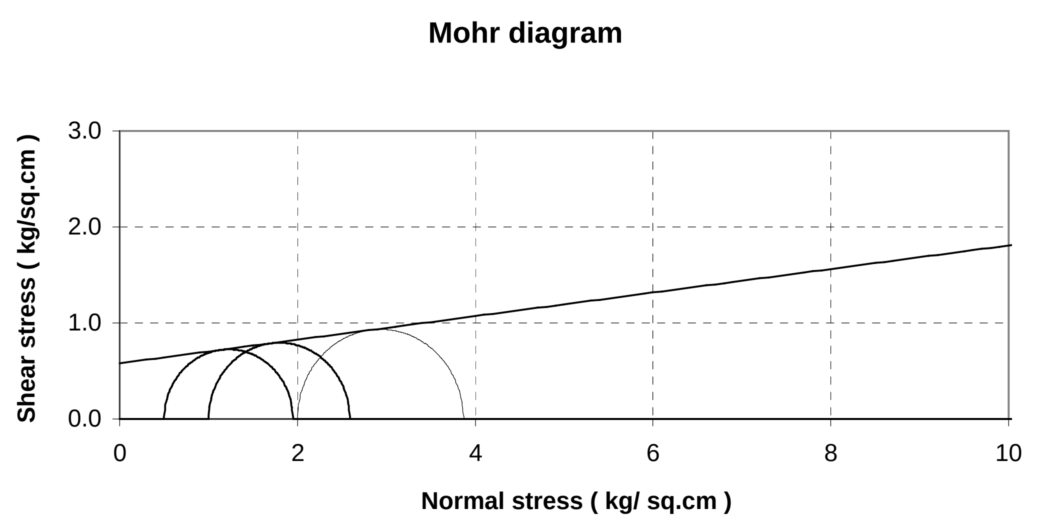
Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.



BH-	GT 11	Depth (m)	2.50	C (kg/cm^2)=	0.83	ϕ (degree) =	10

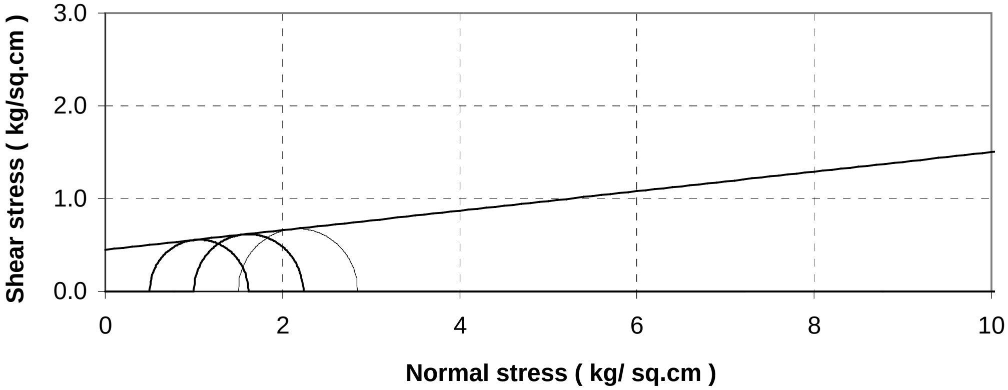


BH-	GT 13	Depth (m)	5.00	C (kg/cm^2)=	0.28	ϕ (degree) =	11



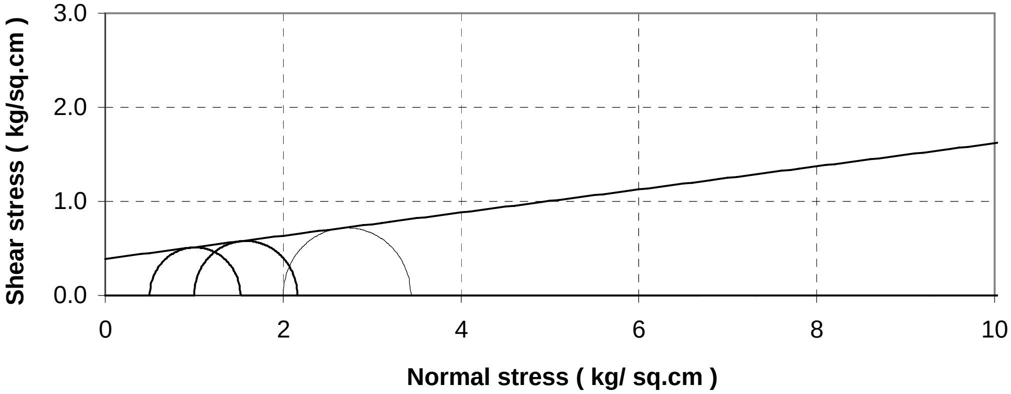
BH-	GT 15	Depth (m)	4.50	C (kg/cm^2)=	0.58	ϕ (degree) =	7

Mohr diagram



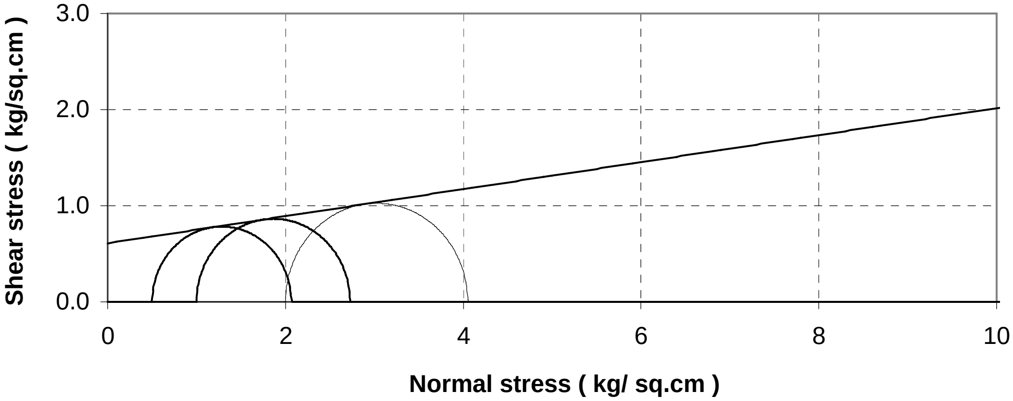
BH-	GT 16	Depth (m)	4.50	C (kg/cm^2)=	0.45	ϕ (degree) =	6

Mohr diagram



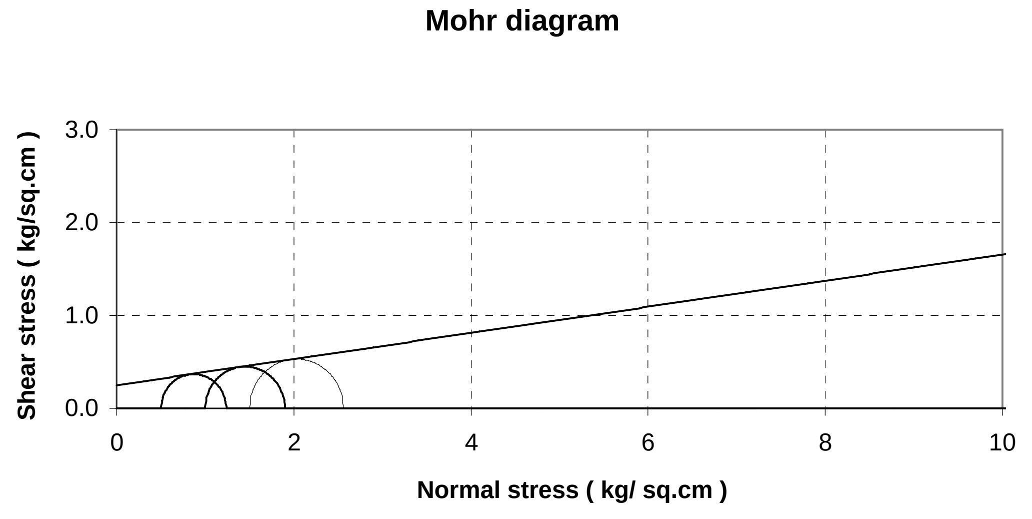
BH-	GT 17	Depth (m)	4.00	C (kg/cm^2)=	0.39	ϕ (degree) =	7

Mohr diagram

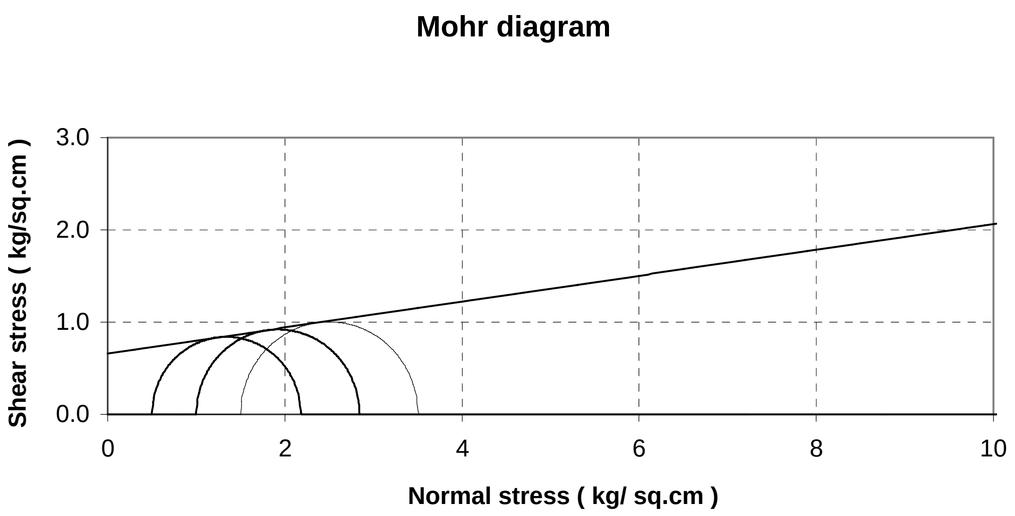


BH-	GT 18	Depth (m)	2.00	C (kg/cm^2)=	0.61	ϕ (degree) =	8

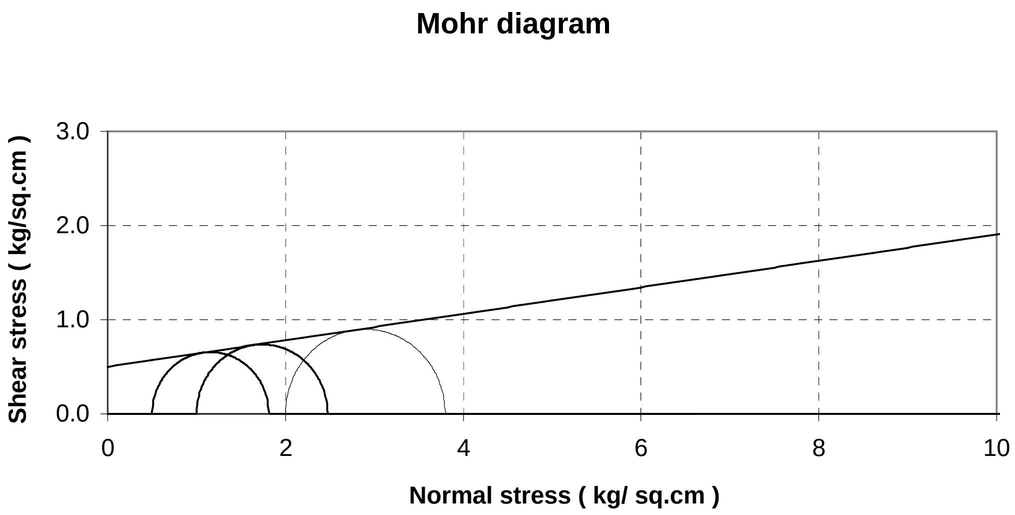
Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.



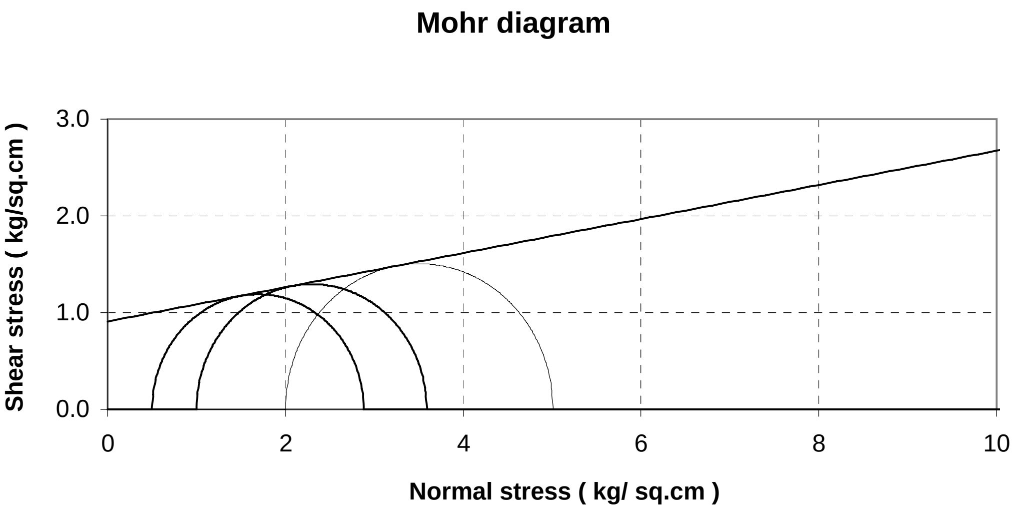
BH-	GT 19	Depth (m)	8.00	C (kg/cm^2)=	0.25	ϕ (degree) =	8



BH-	GT 22	Depth (m)	4.00	C (kg/cm^2)=	0.66	ϕ (degree) =	8

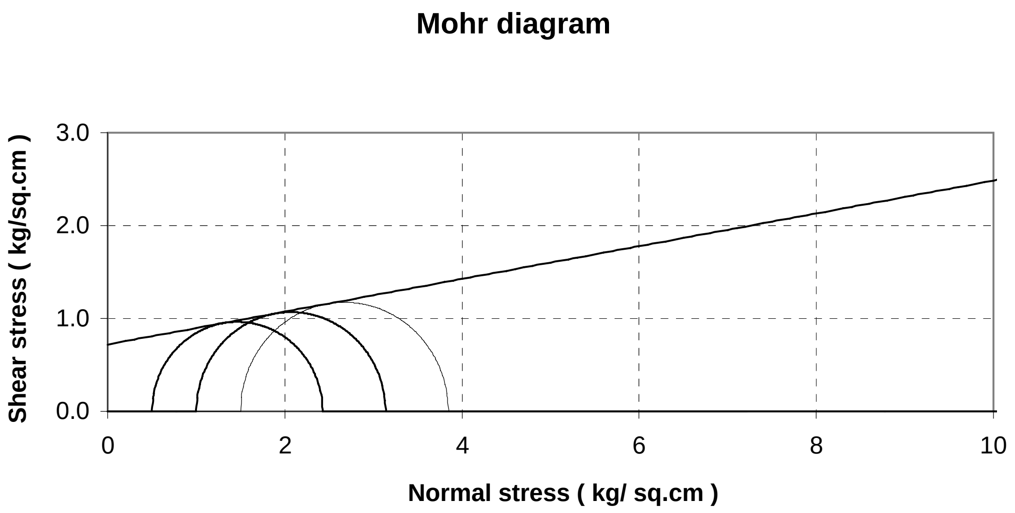


BH-	GT 23	Depth (m)	6.00	C (kg/cm^2)=	0.50	ϕ (degree) =	8

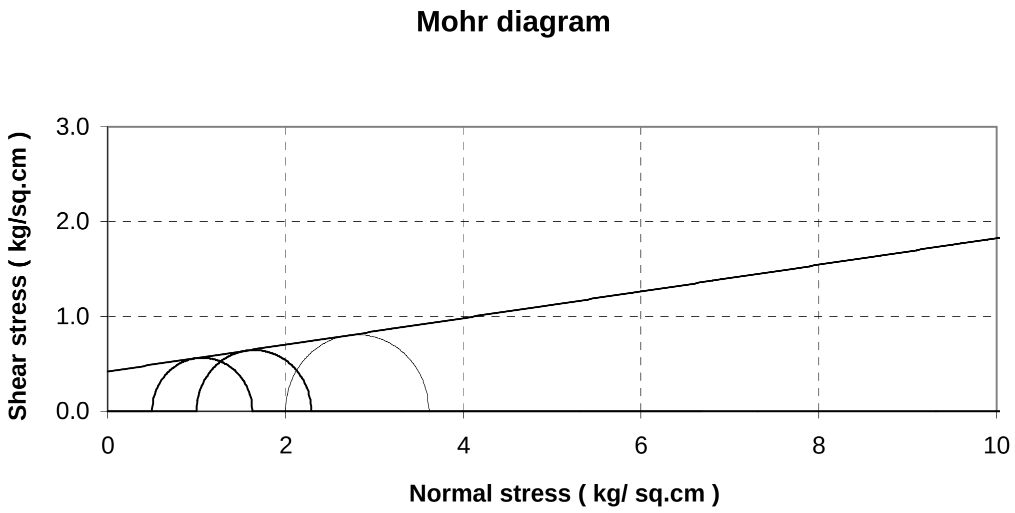


BH-	GT 24	Depth (m)	2.00	C (kg/cm^2)=	0.91	ϕ (degree) =	10

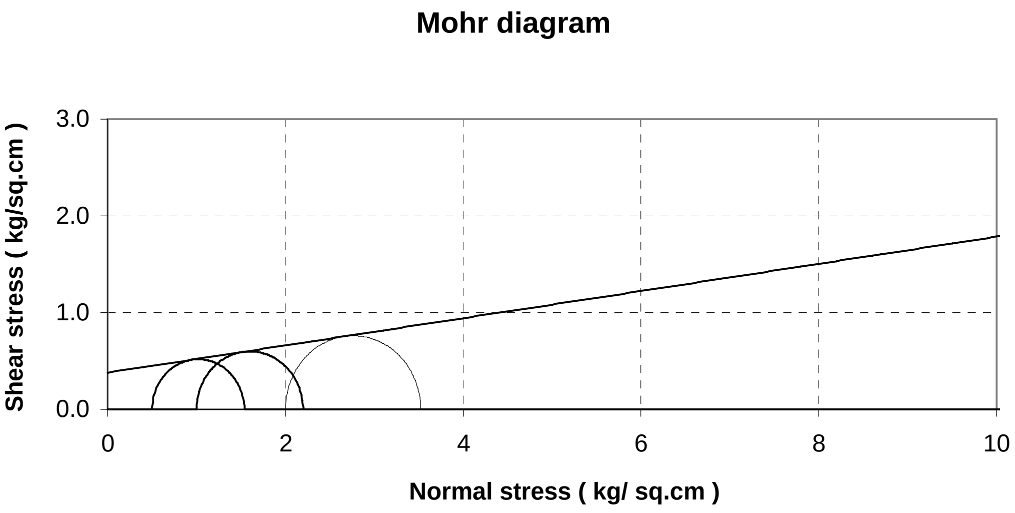
Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.



BH-	GT 25	Depth (m)	5.00	C (kg/cm^2)=	0.72	ϕ (degree) =	10

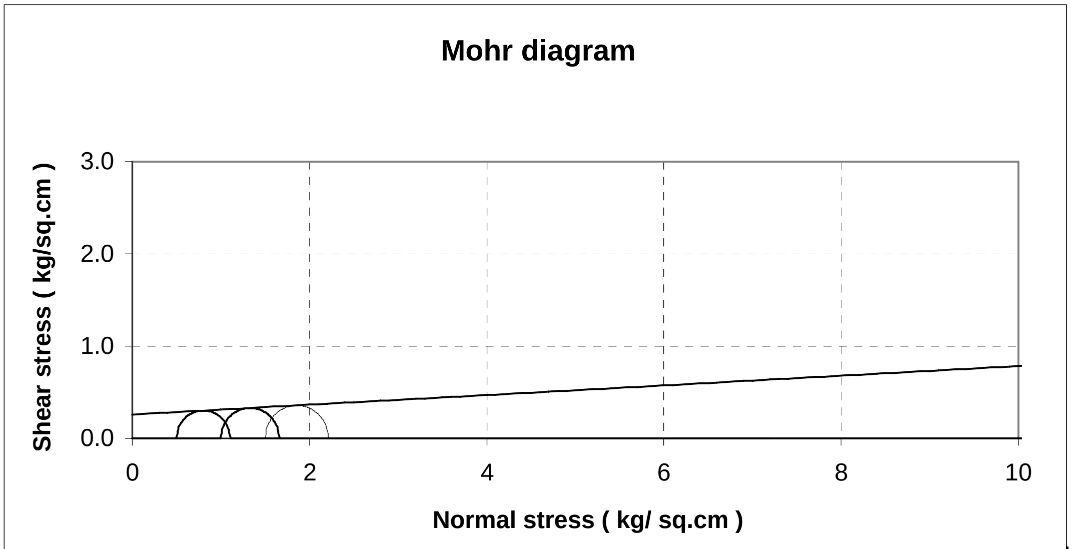


BH-	GT 26	Depth (m)	2.00	C (kg/cm^2)=	0.42	ϕ (degree) =	8

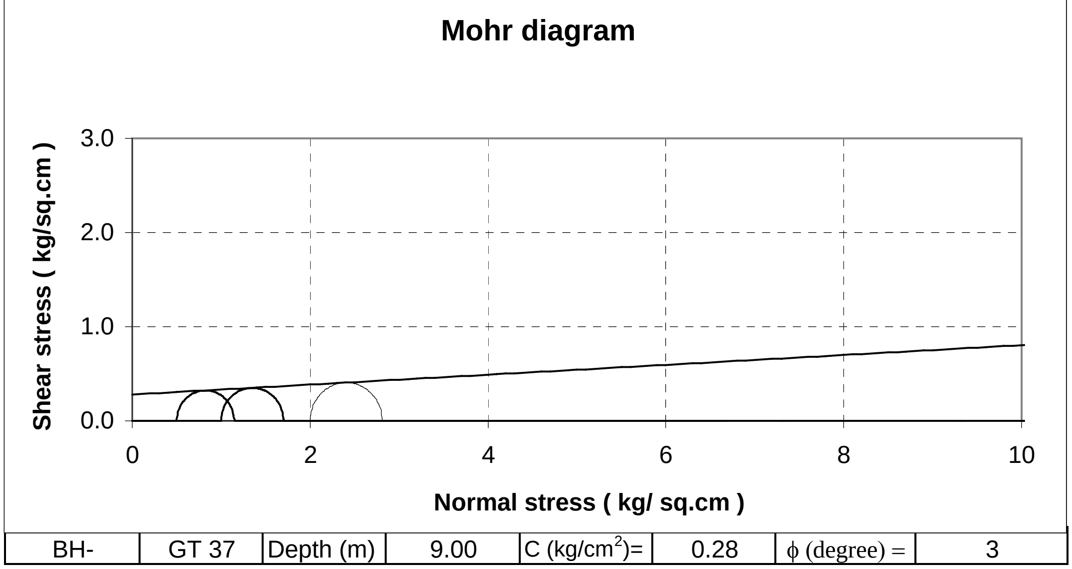


BH-	GT 27	Depth (m)	10.50	C (kg/cm^2)=	0.38	ϕ (degree) =	8

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

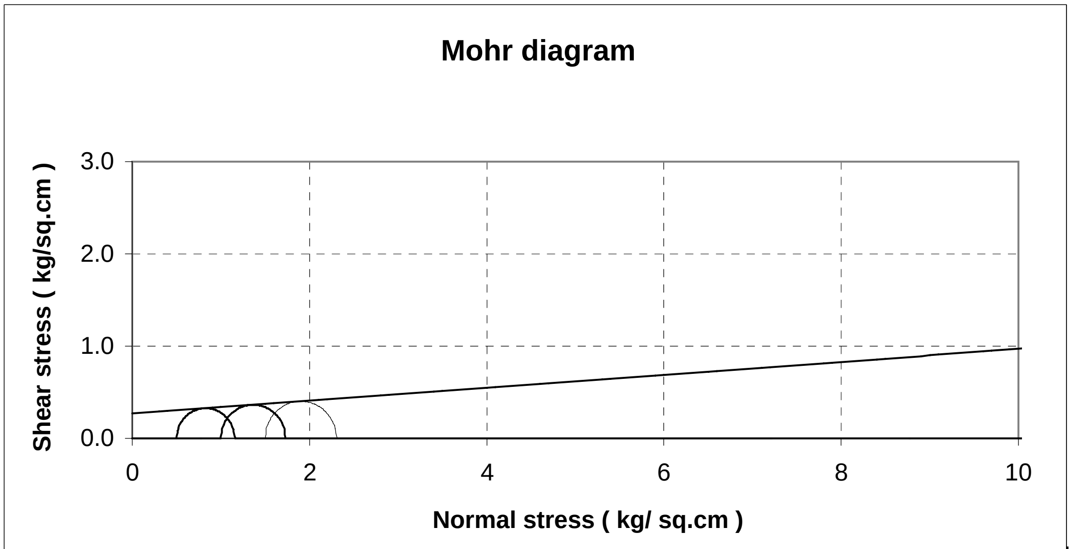


BH-	GT 37	Depth (m)	6.00	C (kg/cm^2)=	0.26	ϕ (degree) =	3

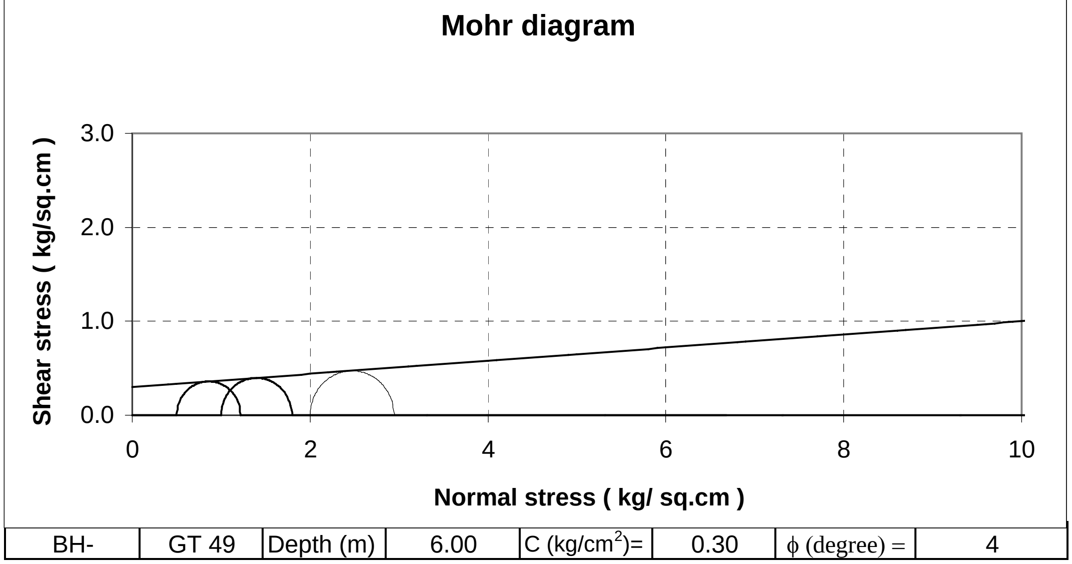


BH-	GT 37	Depth (m)	9.00	C (kg/cm^2)=	0.28	ϕ (degree) =	3

Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

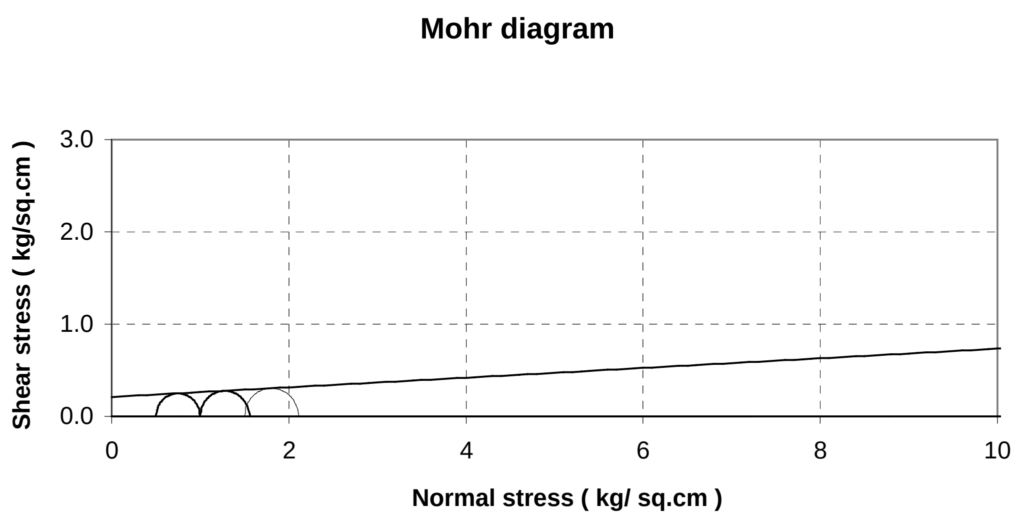


BH-	GT 49	Depth (m)	3.00	C (kg/cm^2)=	0.27	ϕ (degree) =	4

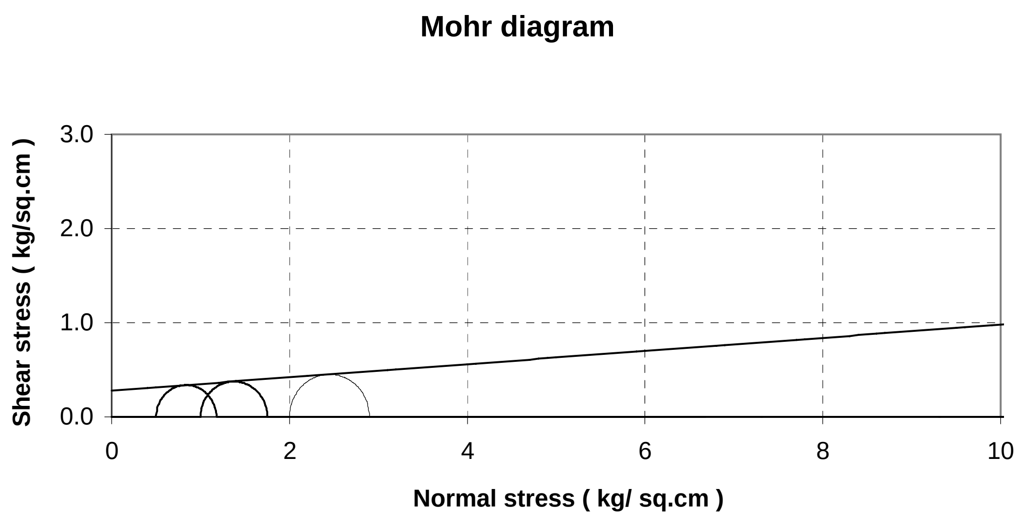


BH-	GT 49	Depth (m)	6.00	C (kg/cm^2)=	0.30	ϕ (degree) =	4

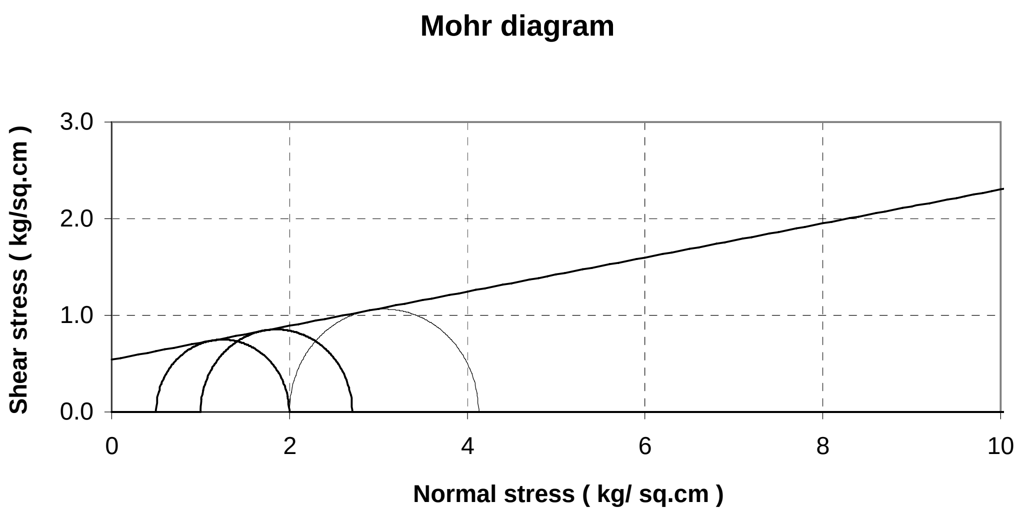
Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.



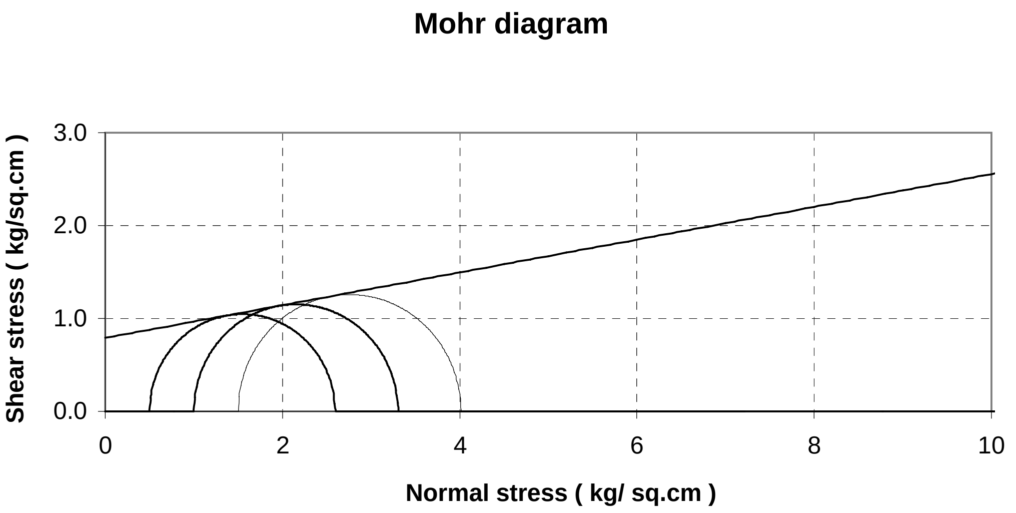
BH-	GT 83	Depth (m)	5.00	C (kg/cm^2)=	0.21	φ (degree) =	3



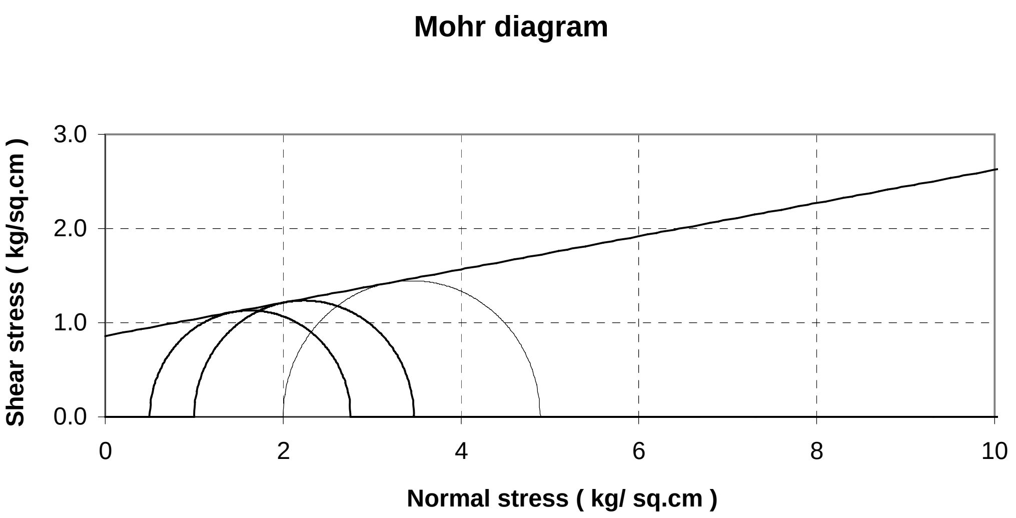
BH-	GT 83	Depth (m)	14.50	C (kg/cm^2)=	0.28	φ (degree) =	4



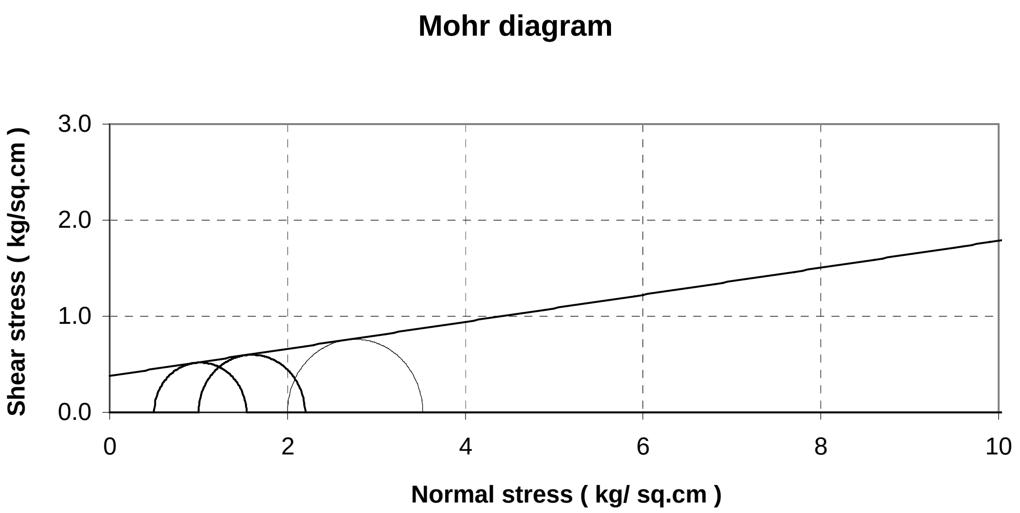
BH-	GT 89	Depth (m)	3.00	C (kg/cm^2)=	0.54	φ (degree) =	10



BH-	GT 94	Depth (m)	10.50	C (kg/cm^2)=	0.79	ϕ (degree) =	10



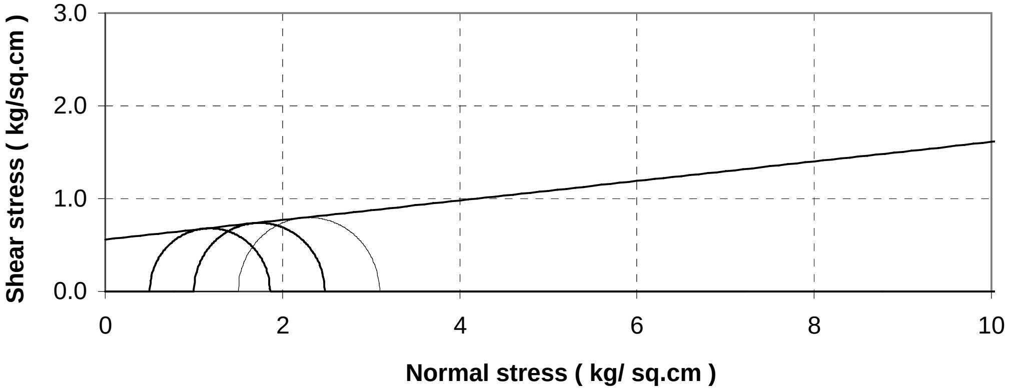
BH-	GT 95	Depth (m)	10.50	C (kg/cm^2)=	0.86	ϕ (degree) =	10



BH-	GT 96	Depth (m)	3.00	C (kg/cm^2)=	0.38	ϕ (degree) =	8

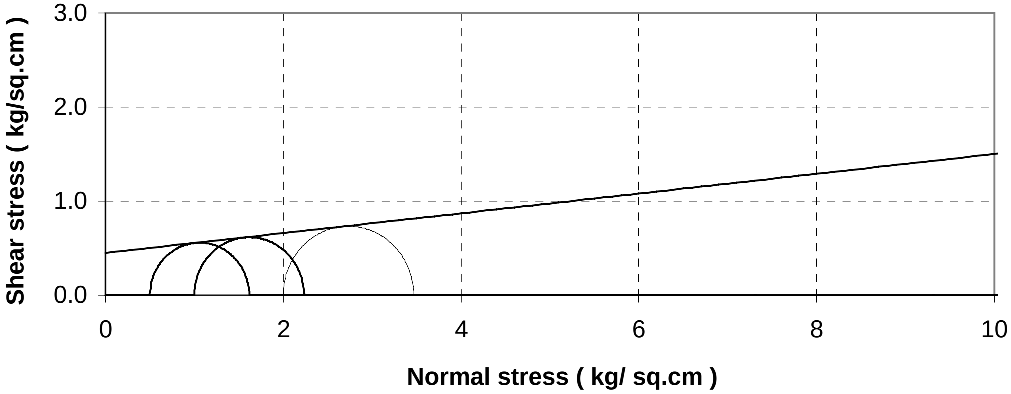
Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Mohr diagram



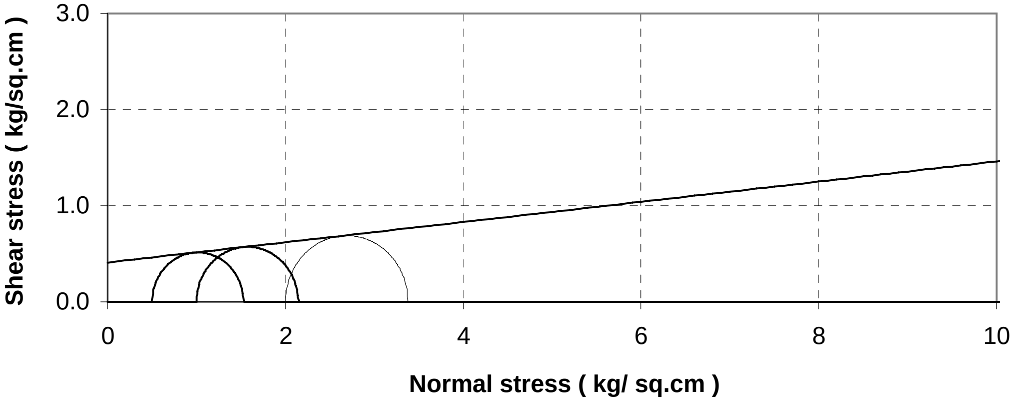
BH-	GT 97	Depth (m)	2.00	C (kg/cm^2)=	0.56	ϕ (degree) =	6

Mohr diagram



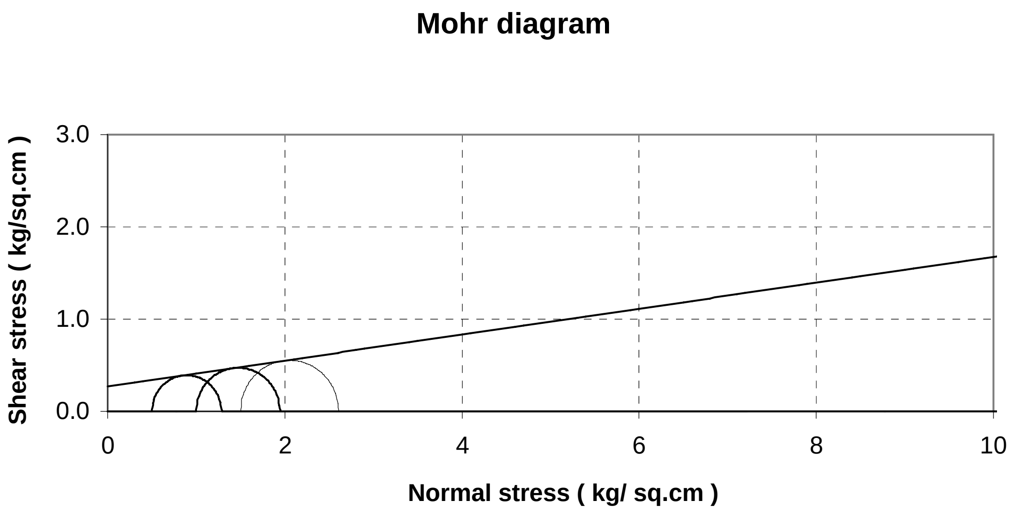
BH-	GT 97	Depth (m)	4.50	C (kg/cm^2)=	0.45	ϕ (degree) =	6

Mohr diagram

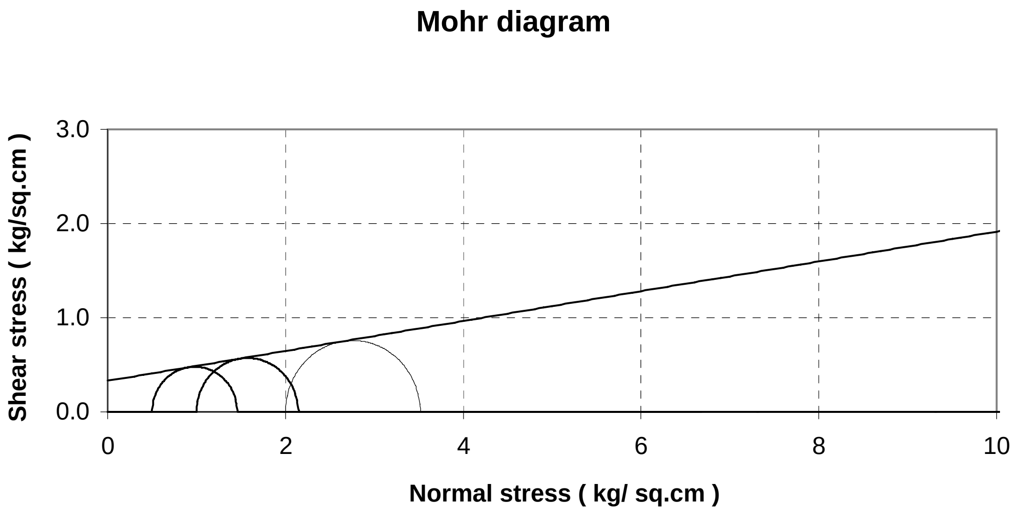


BH-	GT 97	Depth (m)	7.50	C (kg/cm^2)=	0.41	ϕ (degree) =	6

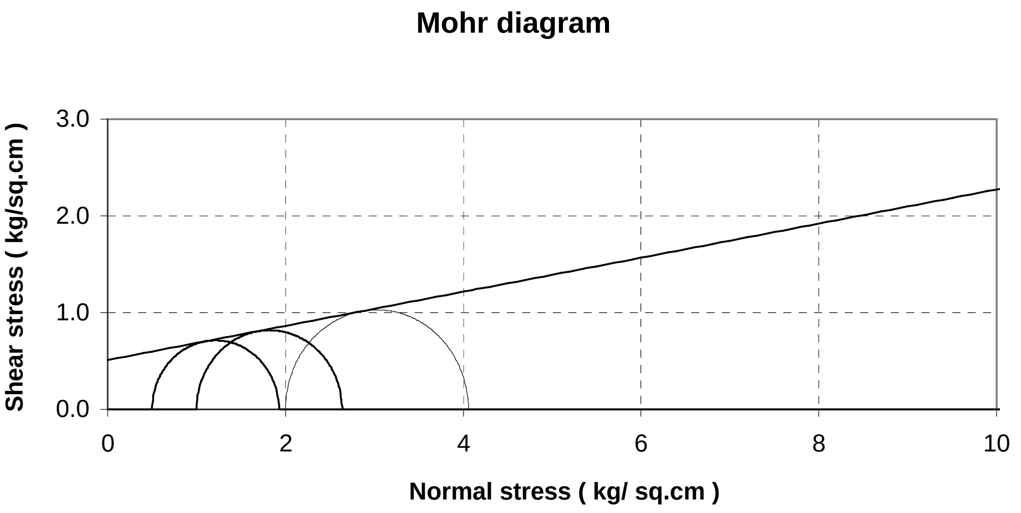
Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.



BH-	GT 98	Depth (m)	6.00	C (kg/cm^2)=	0.27	φ (degree) =	8

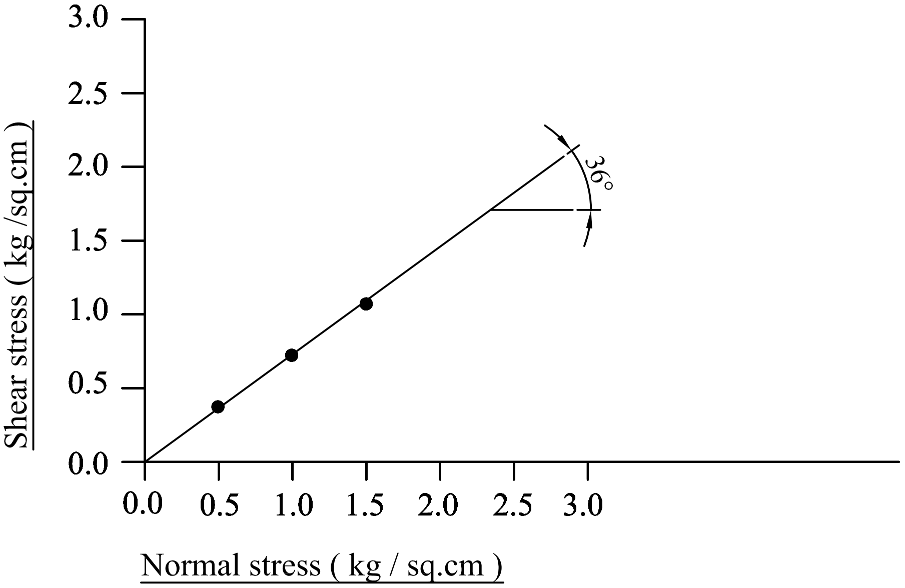


BH-	GT 98	Depth (m)	9.00	C (kg/cm^2)=	0.33	φ (degree) =	9



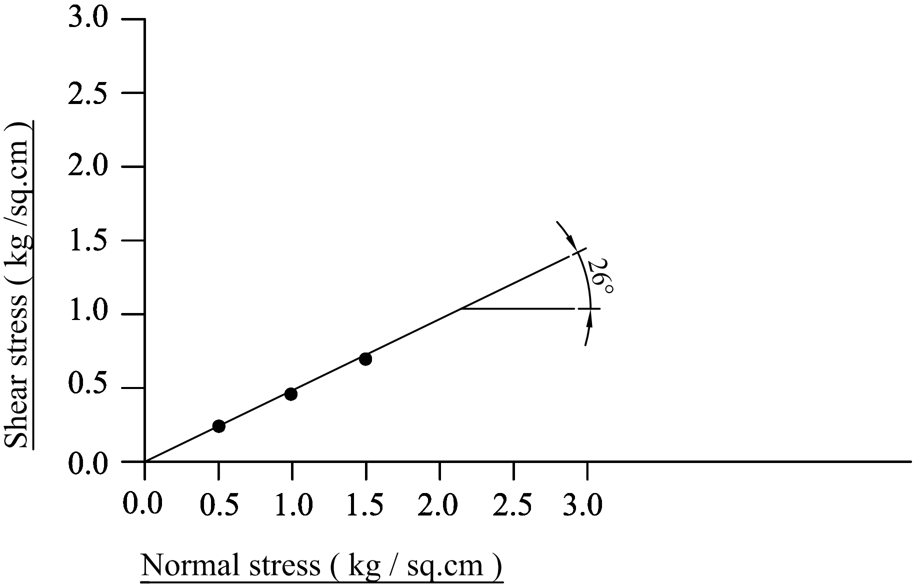
BH-	GT 98	Depth (m)	13.50	C (kg/cm^2)=	0.51	φ (degree) =	10

Direct Shear Plot



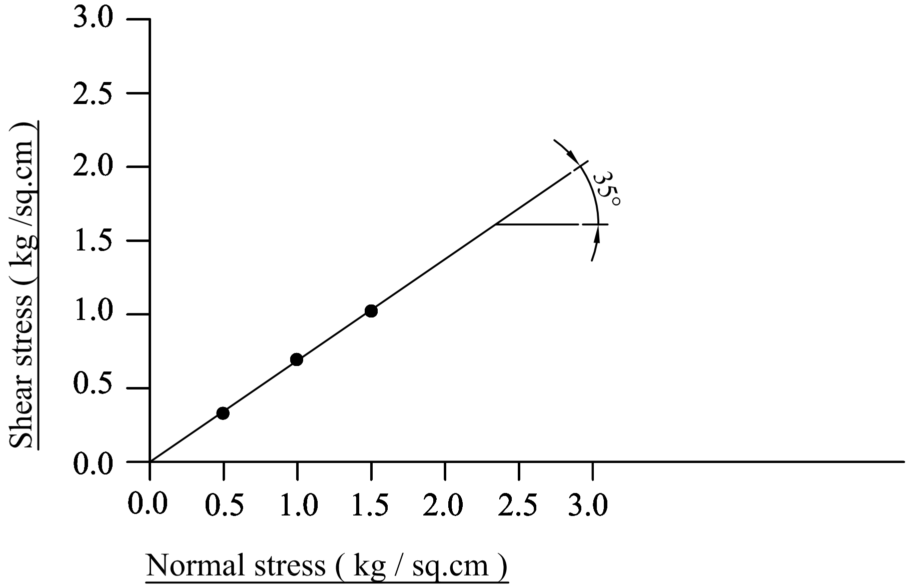
BH	GT 14	Depth(m.)	27.00	c(kg/cm^2) =	-	φ (degree) =	36

Direct Shear Plot



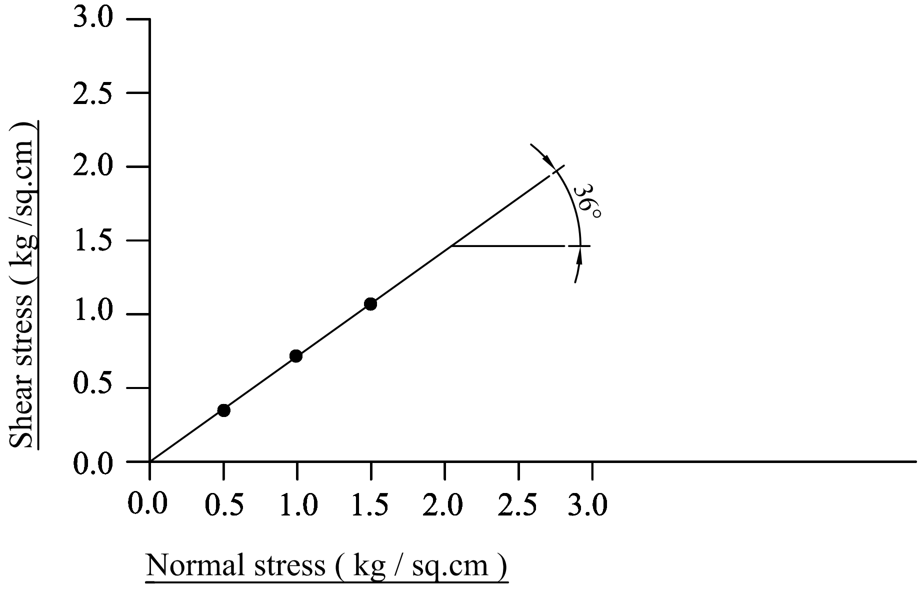
BH	GT 15	Depth(m.)	7.50	c(kg/cm^2) =	-	φ (degree) =	26

Direct Shear Plot



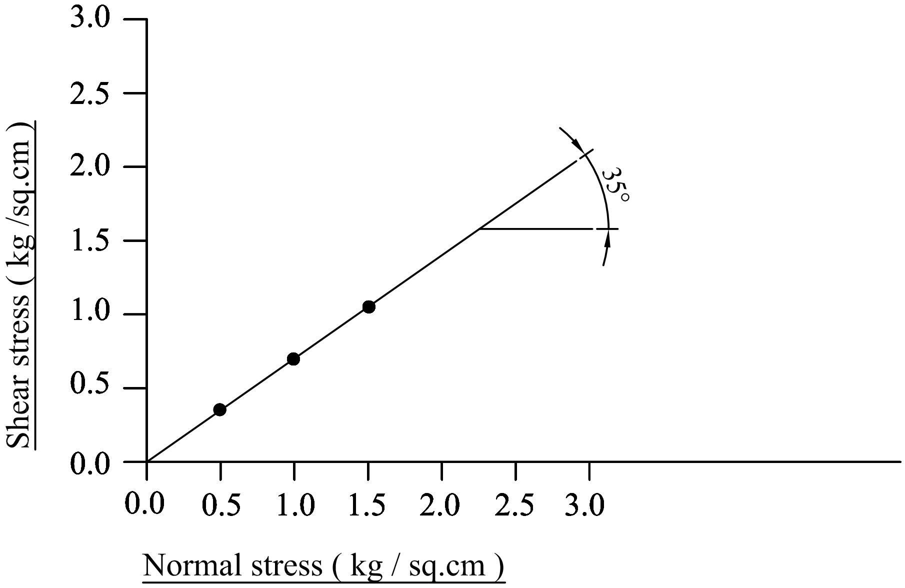
BH	GT 15	Depth(m.)	22.50	c(kg/cm^2) =	-	φ (degree) =	35

Direct Shear Plot



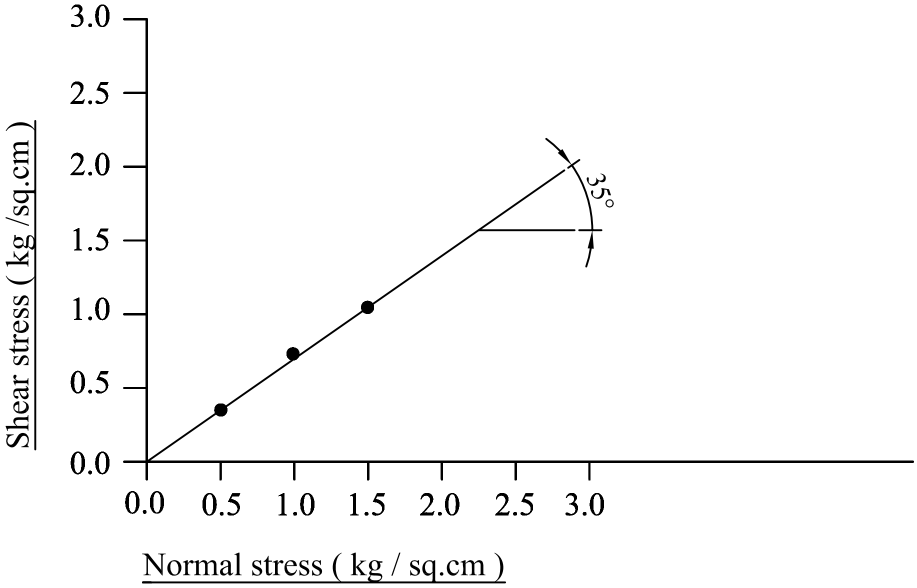
BH	GT 15	Depth(m.)	27.50	c(kg/cm^2) =	-	φ (degree) =	36

Direct Shear Plot



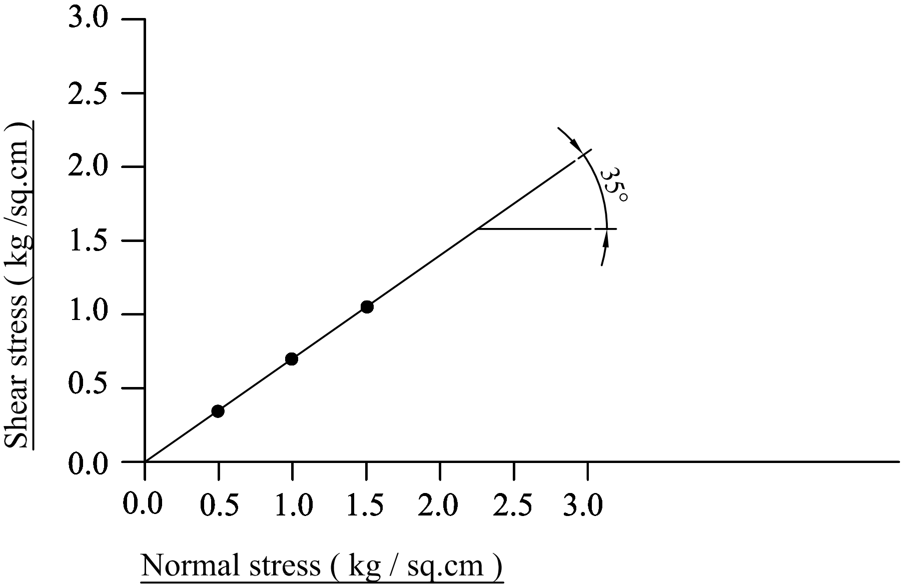
BH	GT 16	Depth(m.)	13.50	c(kg/cm^2) =	-	φ (degree) =	35

Direct Shear Plot



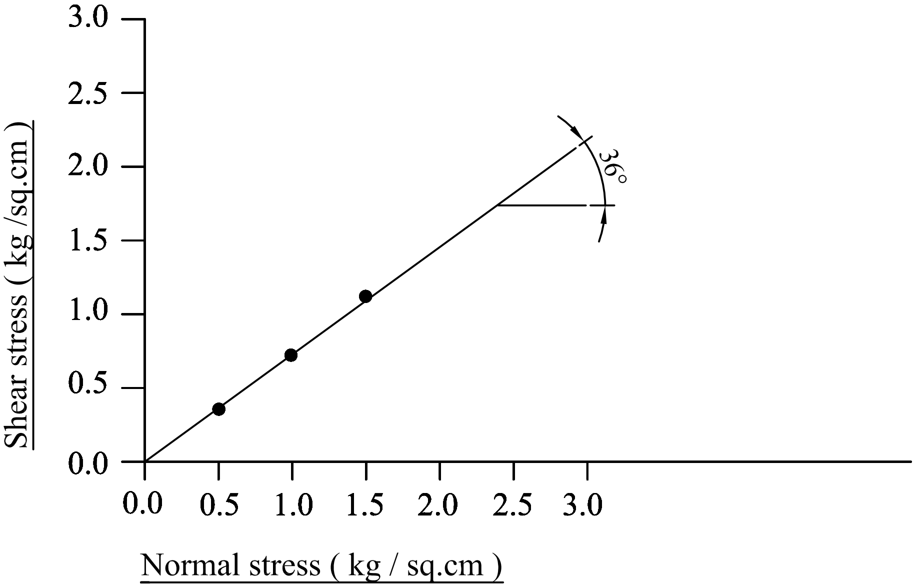
BH	GT 16	Depth(m.)	18.00	c(kg/cm^2) =	-	φ (degree) =	35

Direct Shear Plot



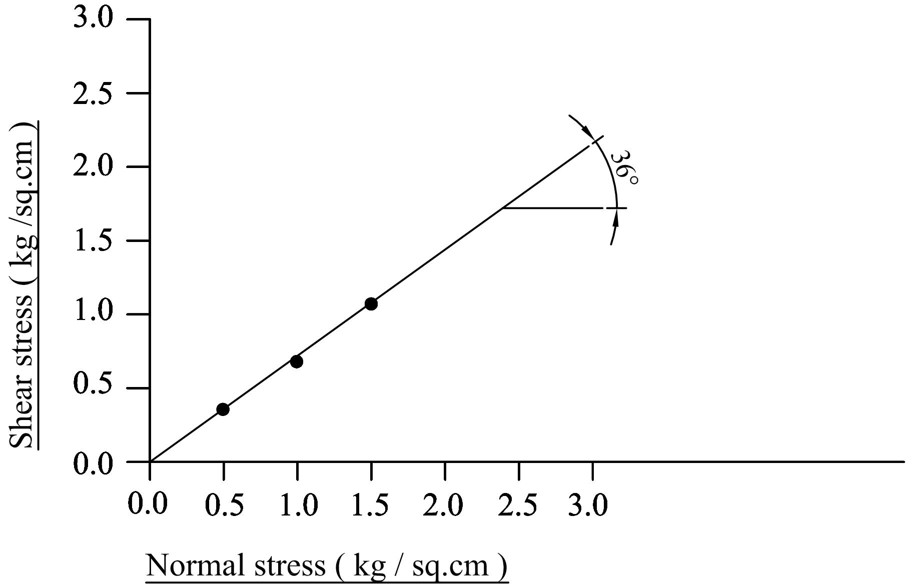
BH	GT 16	Depth(m.)	24.00	c(kg/cm^2) =	-	φ (degree) =	35

Direct Shear Plot



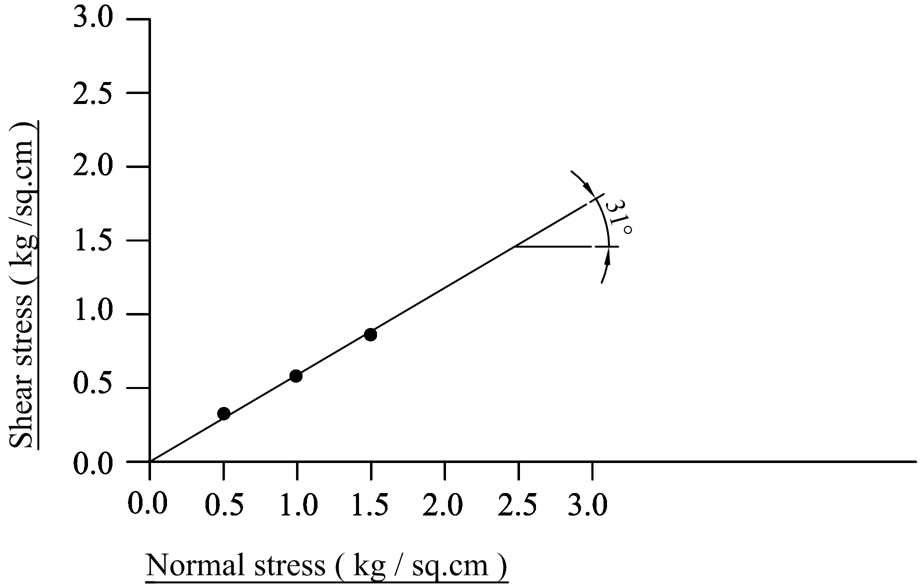
BH	GT 16	Depth(m.)	36.00	c(kg/cm^2) =	-	φ (degree) =	36

Direct Shear Plot



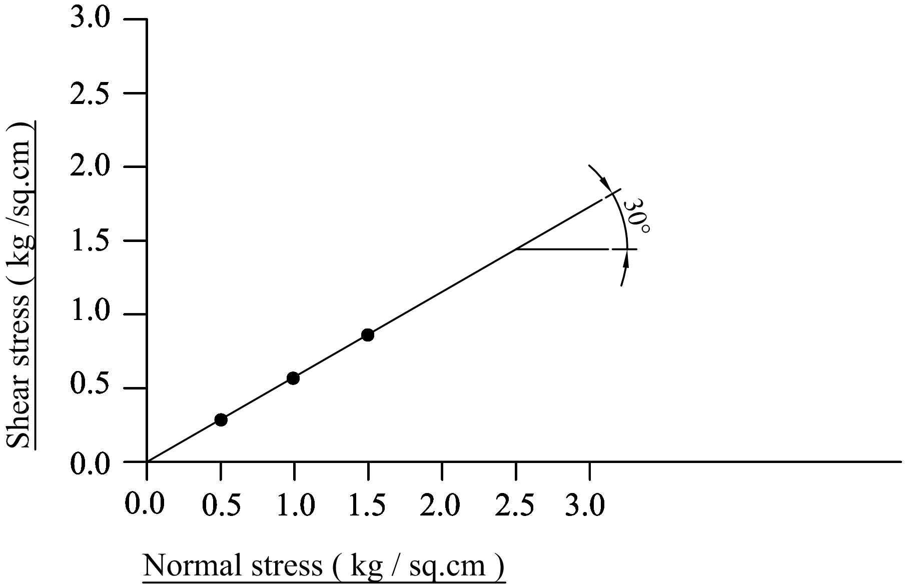
BH	GT 16	Depth(m.)	41.00	c(kg/cm^2) =	-	φ (degree) =	36

Direct Shear Plot



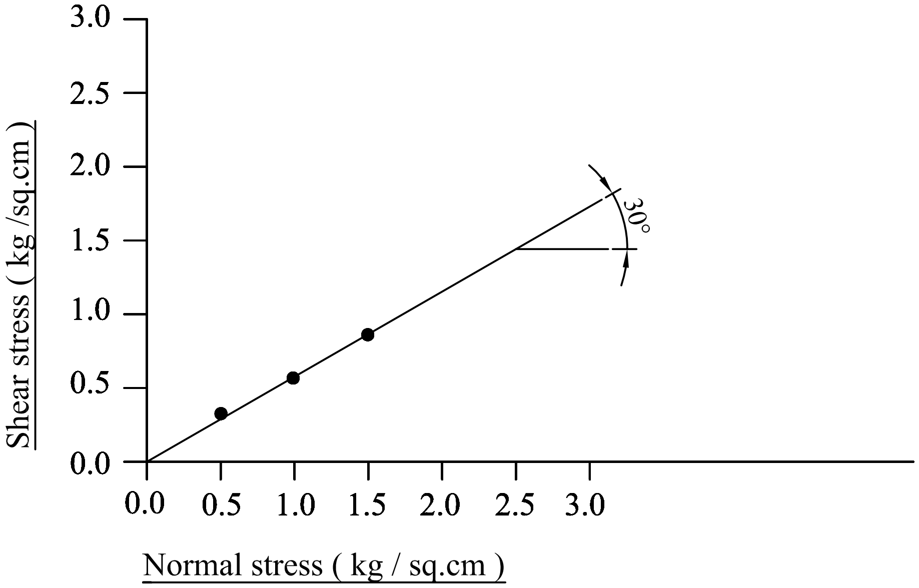
BH	GT 17	Depth(m.)	10.50	c(kg/cm^2) =	-	φ (degree) =	31

Direct Shear Plot



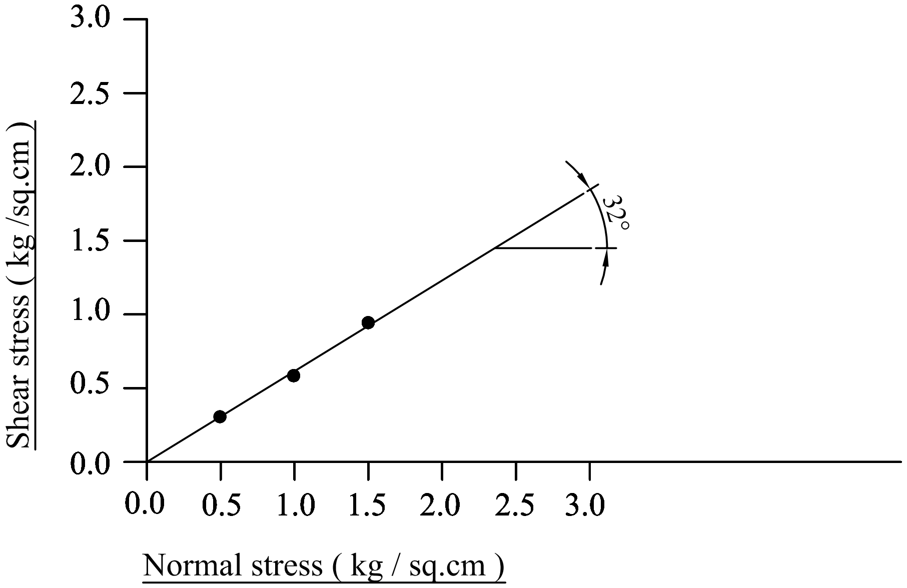
BH	GT 17	Depth(m.)	16.50	c(kg/cm^2) =	-	φ (degree) =	30

Direct Shear Plot



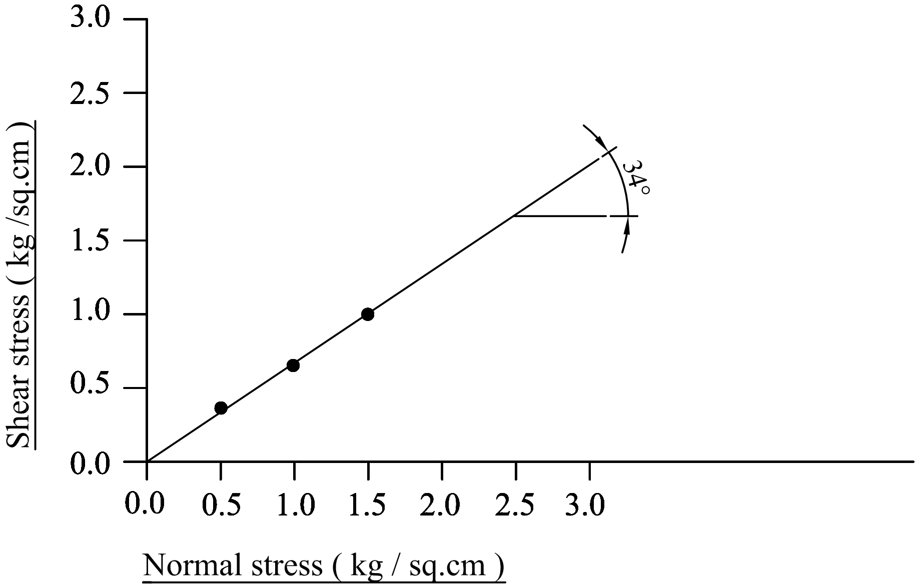
BH	GT 17	Depth(m.)	22.50	c(kg/cm^2) =	-	φ (degree) =	30

Direct Shear Plot



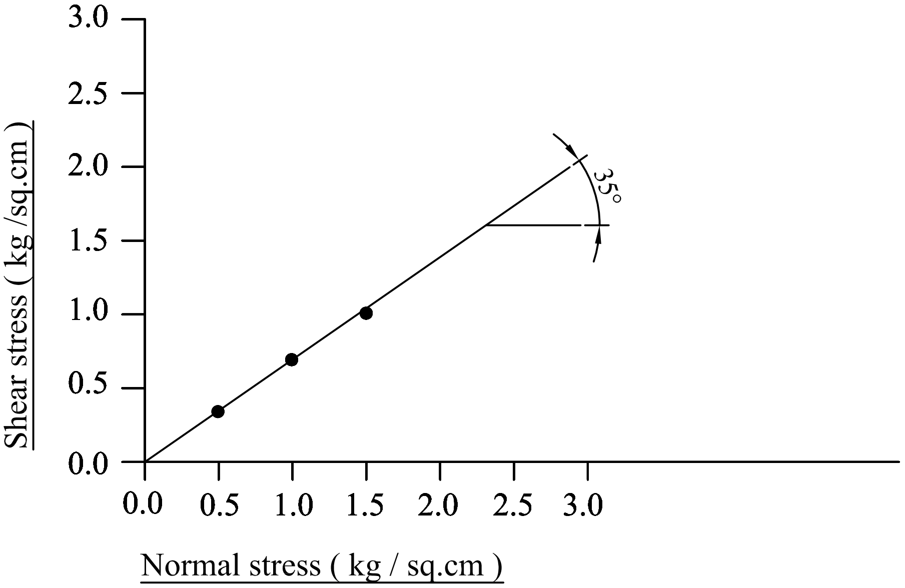
BH	GT 17	Depth(m.)	28.50	c(kg/cm^2) =	-	φ (degree) =	32

Direct Shear Plot



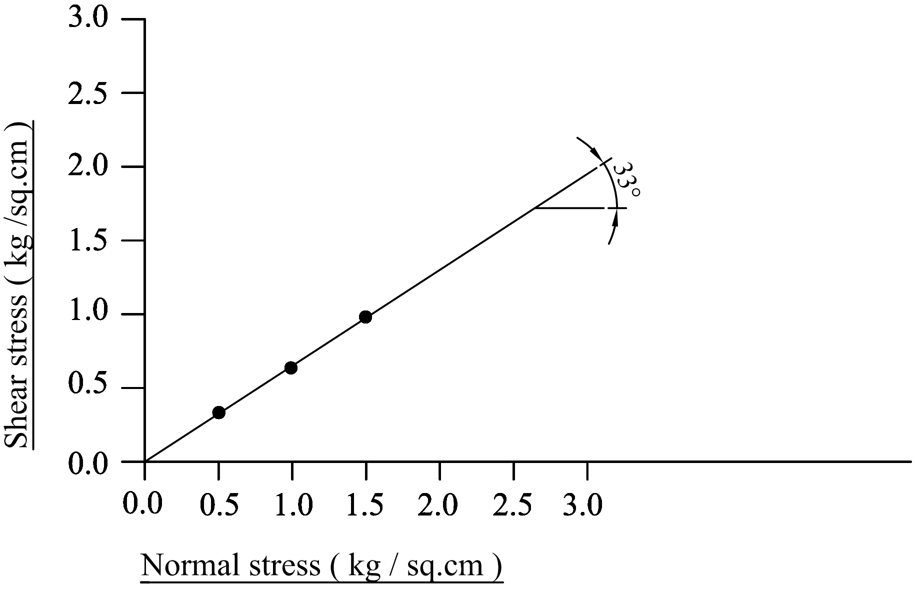
BH	GT 17	Depth(m.)	34.50	c(kg/cm^2) =	-	φ (degree) =	34

Direct Shear Plot



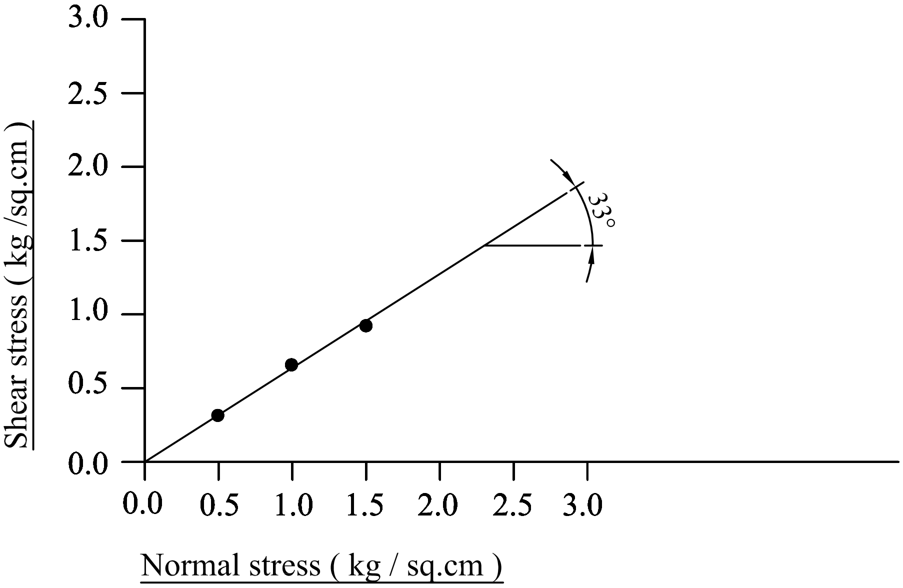
BH	GT 17	Depth(m.)	40.50	c(kg/cm^2) =	-	φ (degree) =	35

Direct Shear Plot



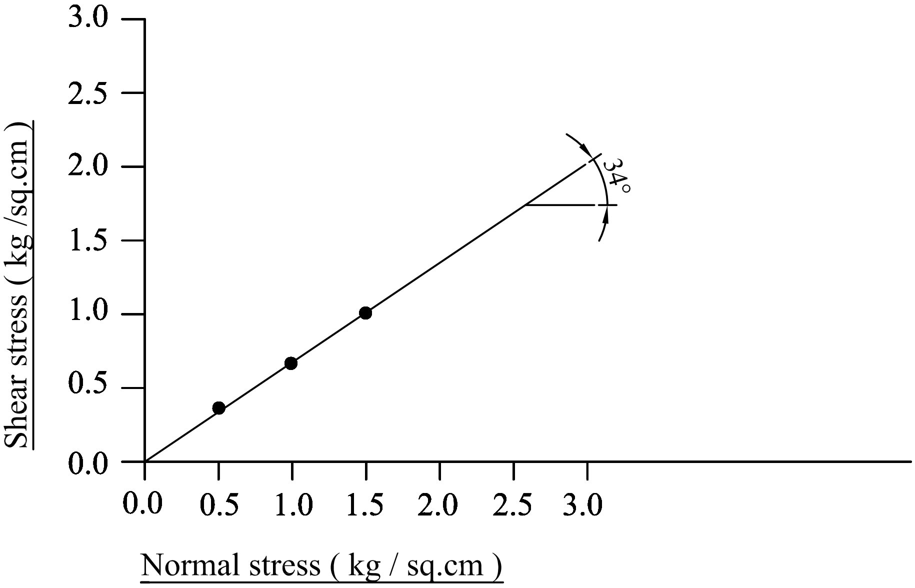
BH	GT 18	Depth(m.)	13.50	c(kg/cm^2) =	-	φ (degree) =	33

Direct Shear Plot



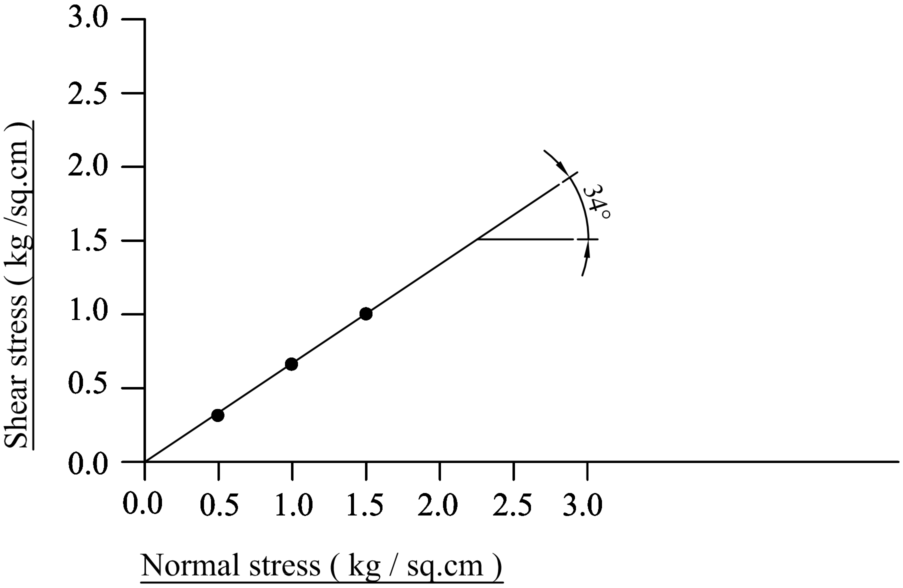
BH	GT 18	Depth(m.)	19.50	c(kg/cm^2) =	-	φ (degree) =	33

Direct Shear Plot



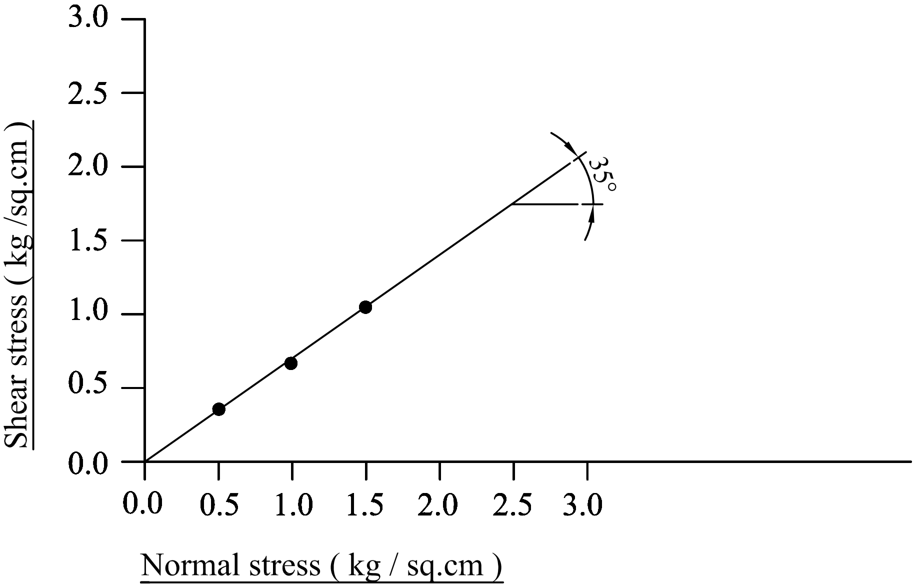
BH	GT 18	Depth(m.)	25.50	c(kg/cm^2) =	-	φ (degree) =	34

Direct Shear Plot



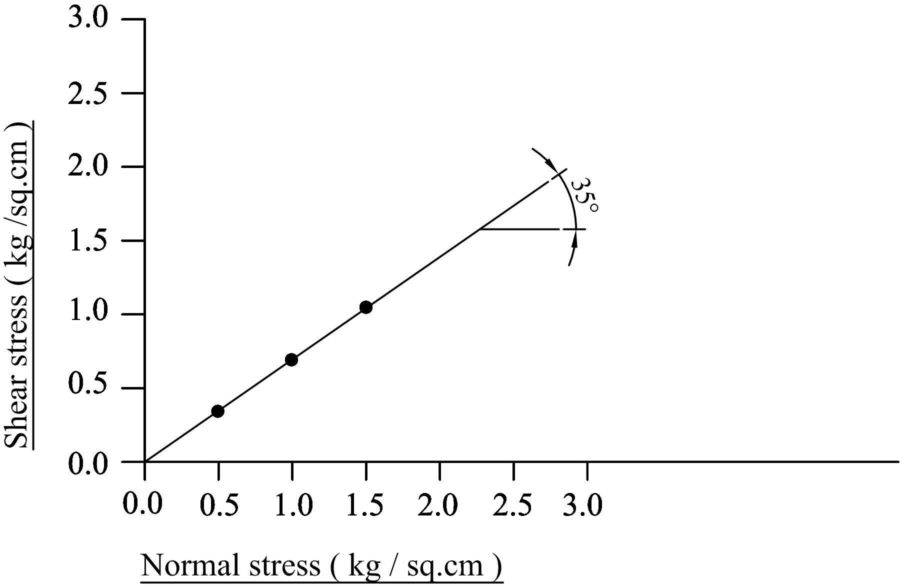
BH	GT 18	Depth(m.)	31.50	c(kg/cm^2) =	-	φ (degree) =	34

Direct Shear Plot



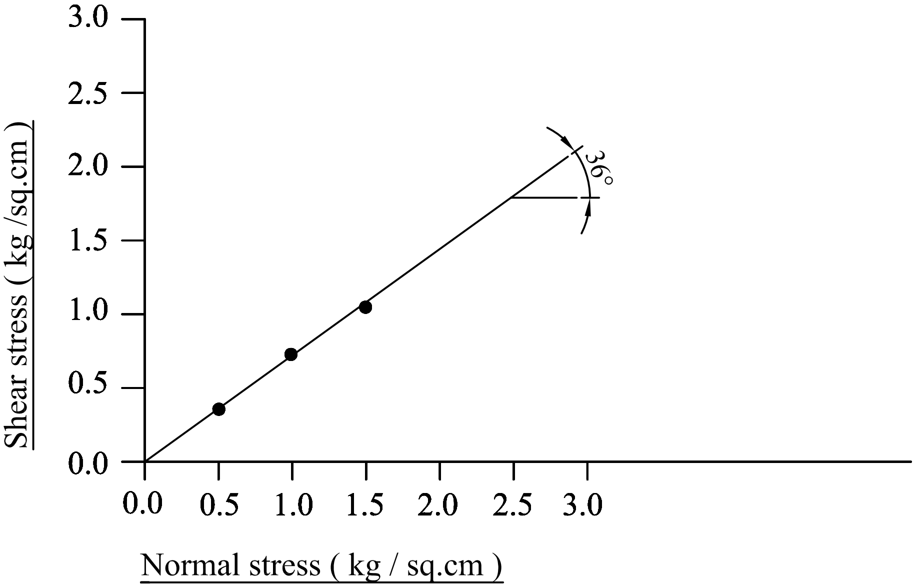
BH	GT 18	Depth(m.)	34.50	c(kg/cm^2) =	-	φ (degree) =	35

Direct Shear Plot



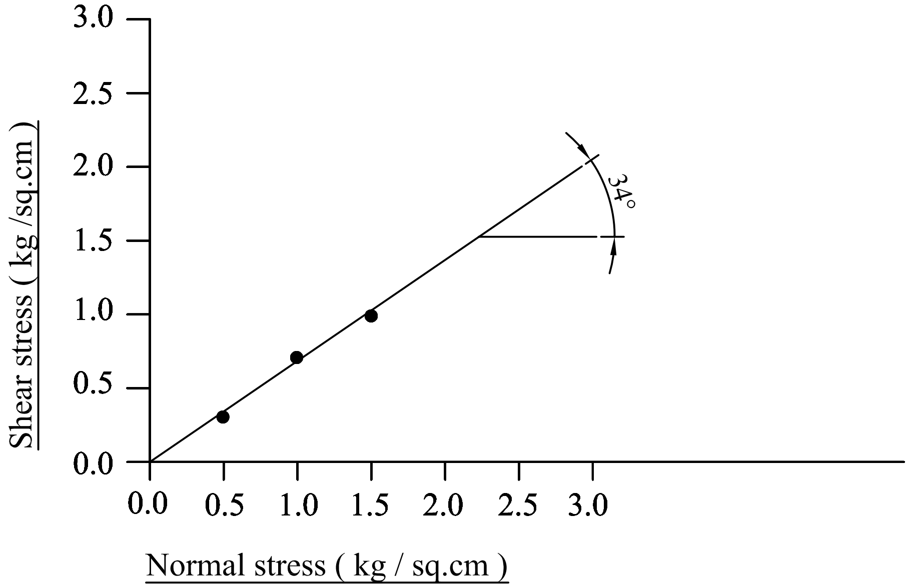
BH	GT 19	Depth(m.)	11.50	c(kg/cm^2) =	-	φ (degree) =	35

Direct Shear Plot



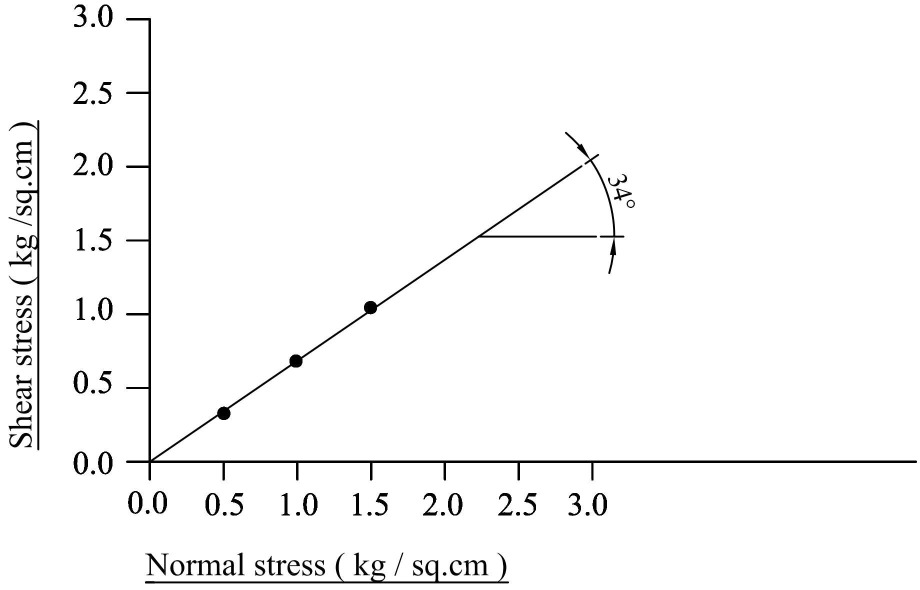
BH	GT 20	Depth(m.)	28.50	c(kg/cm^2) =	-	φ (degree) =	36

Direct Shear Plot



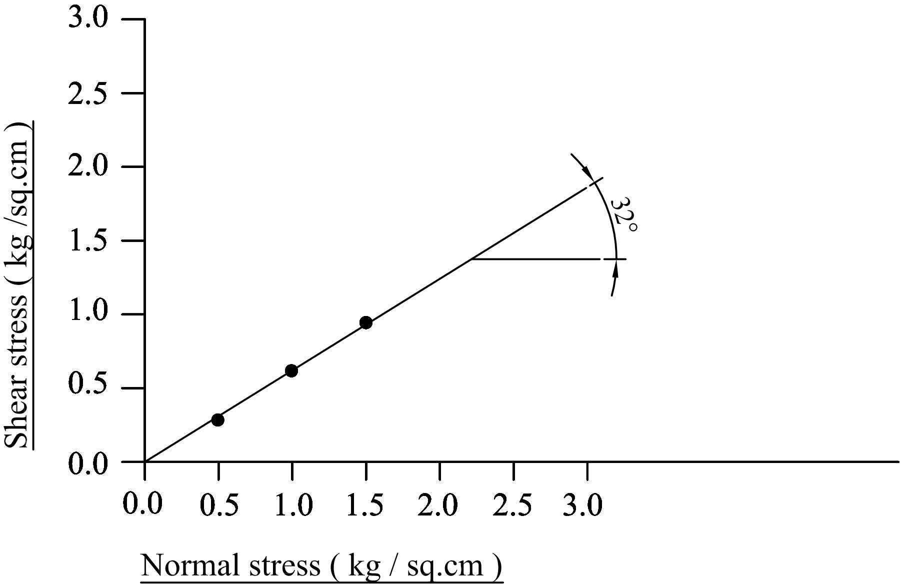
BH	GT 22	Depth(m.)	10.50	c(kg/cm^2) =	-	φ (degree) =	34

Direct Shear Plot



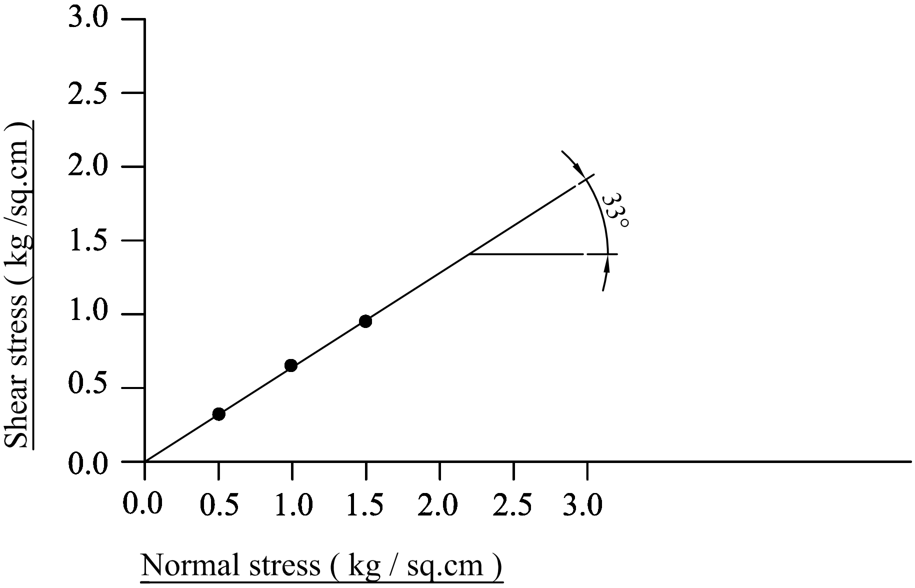
BH	GT 22	Depth(m.)	16.50	c(kg/cm^2) =	-	φ (degree) =	34

Direct Shear Plot



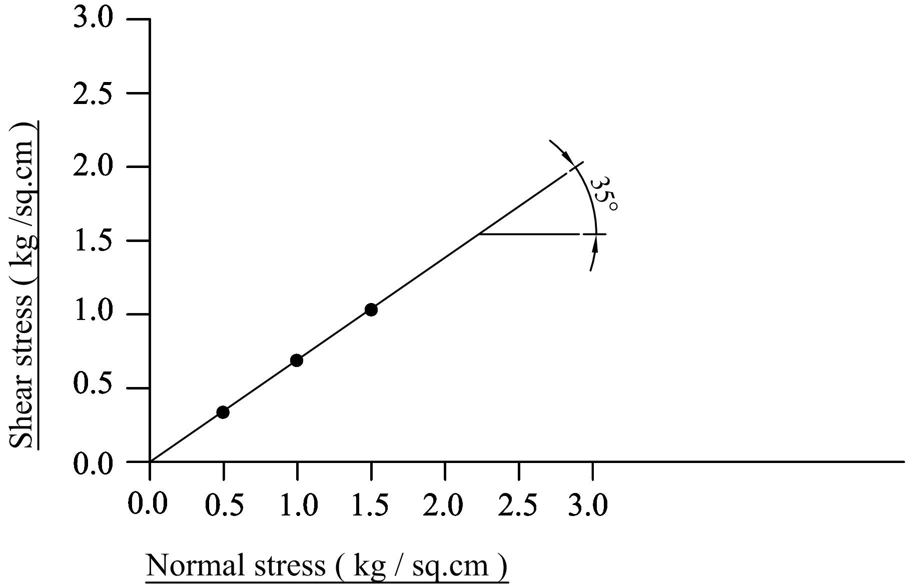
BH	GT 22	Depth(m.)	22.50	c(kg/cm²) =	-	φ (degree) =	32

Direct Shear Plot



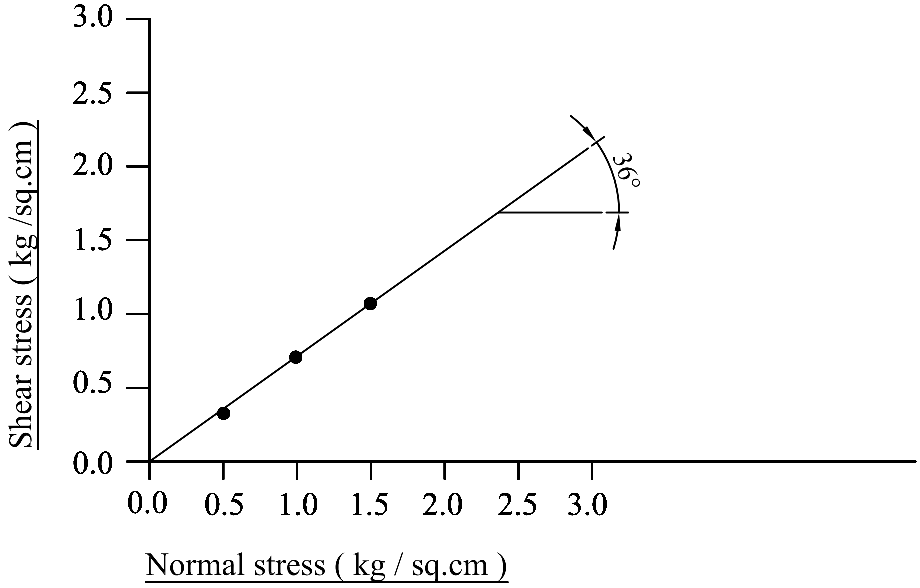
BH	GT 22	Depth(m.)	28.50	c(kg/cm²) =	-	φ (degree) =	33

Direct Shear Plot



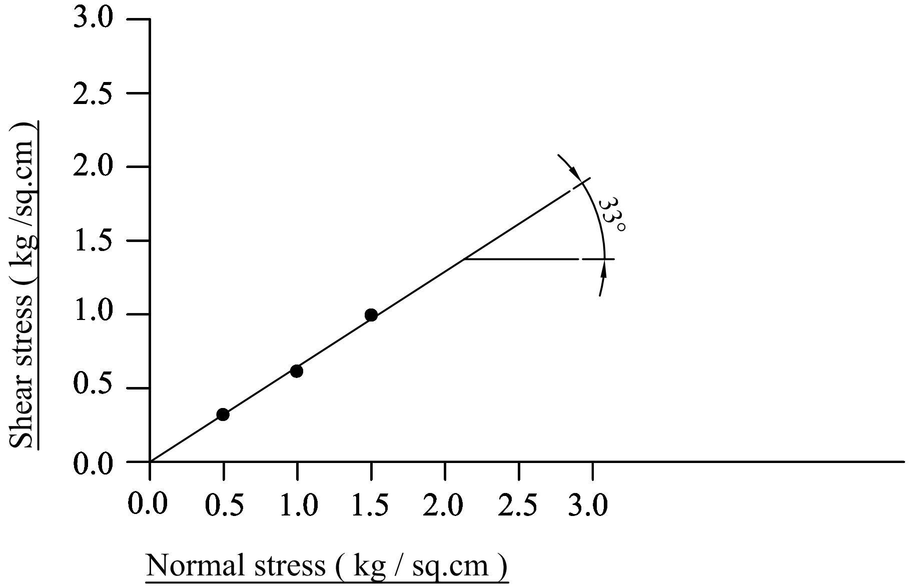
BH	GT 22	Depth(m.)	34.50	c(kg/cm^2) =	-	φ (degree) =	35

Direct Shear Plot



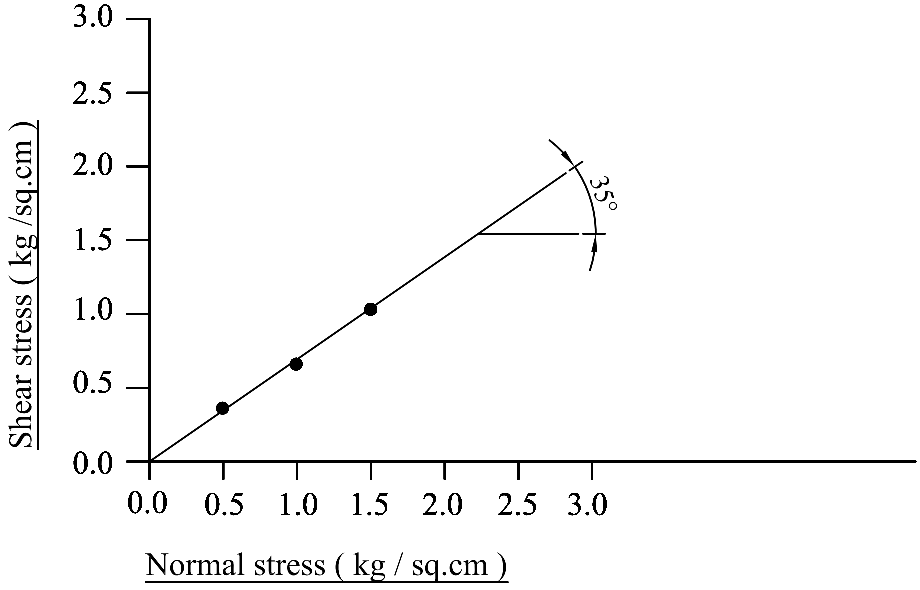
BH	GT 22	Depth(m.)	40.50	c(kg/cm^2) =	-	φ (degree) =	36

Direct Shear Plot



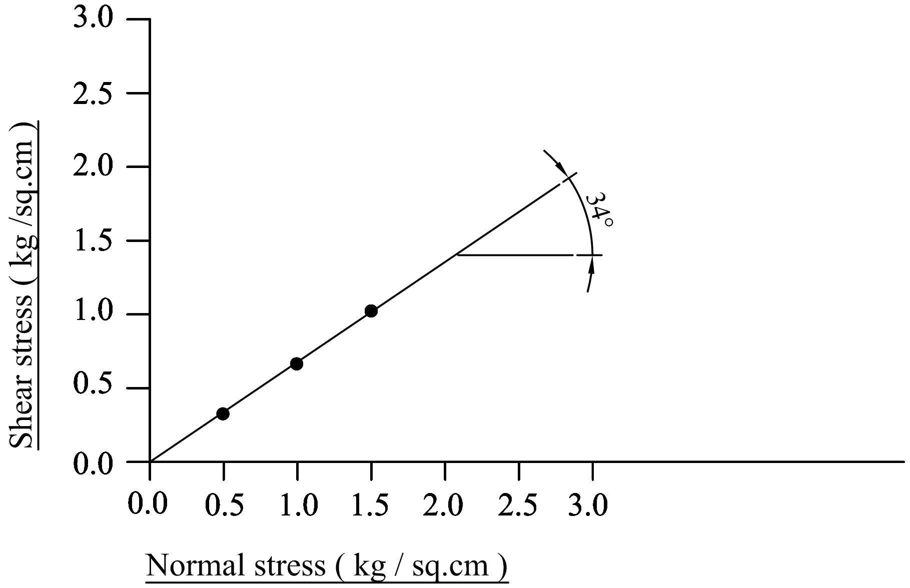
BH	GT 24	Depth(m.)	19.50	c(kg/cm^2) =	-	φ (degree) =	33

Direct Shear Plot



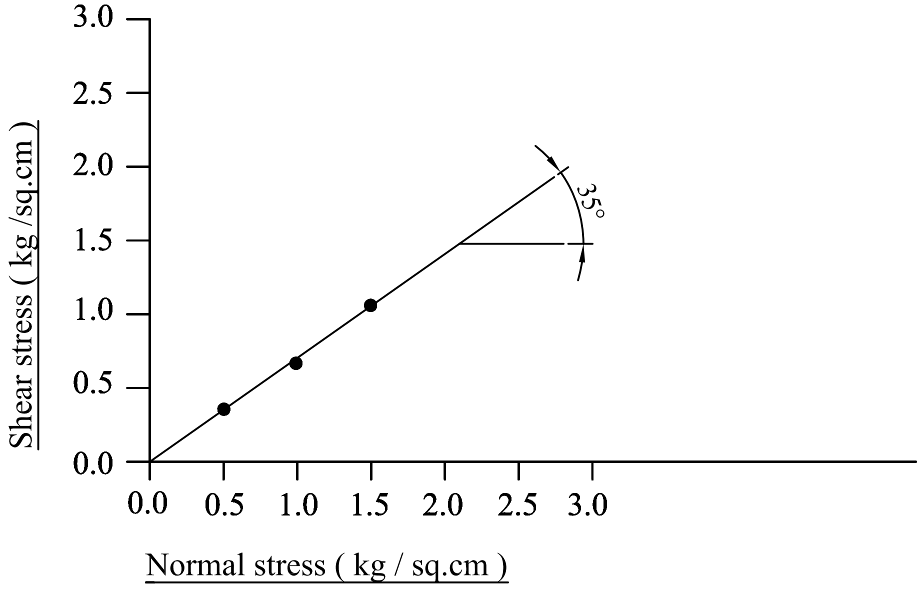
BH	GT 24	Depth(m.)	25.50	c(kg/cm^2) =	-	φ (degree) =	35

Direct Shear Plot



BH	GT 25	Depth(m.)	22.50	c(kg/cm^2) =	-	φ (degree) =	34

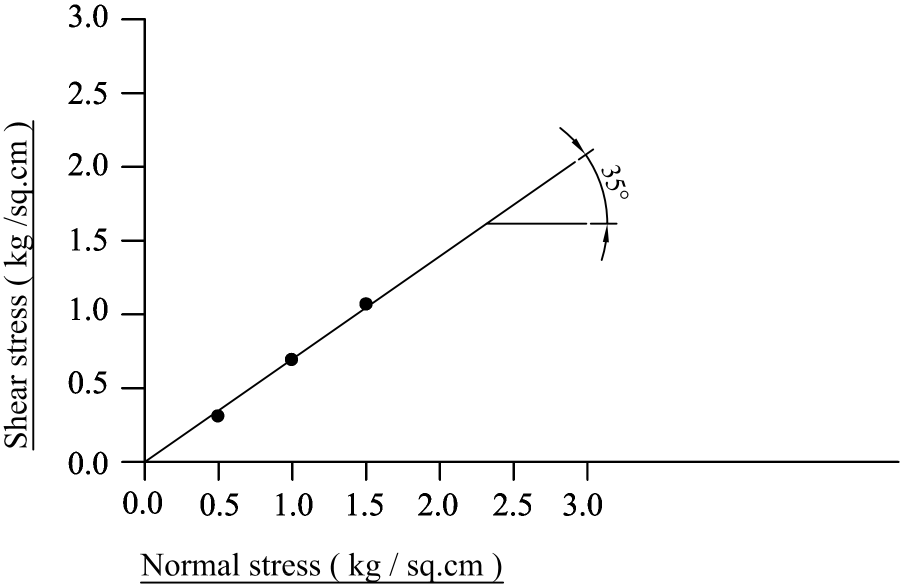
Direct Shear Plot



BH	GT 25	Depth(m.)	31.50	c(kg/cm^2) =	-	φ (degree) =	35

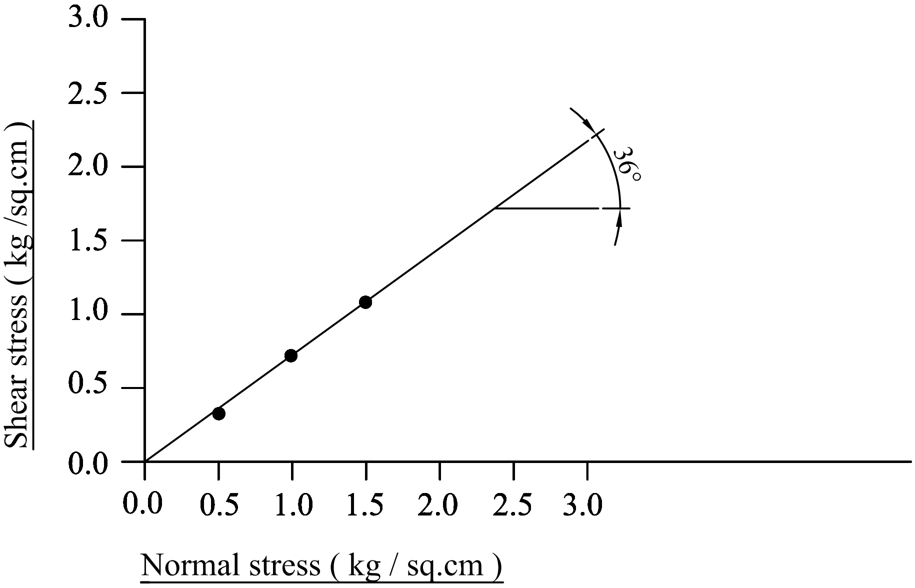
Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Direct Shear Plot



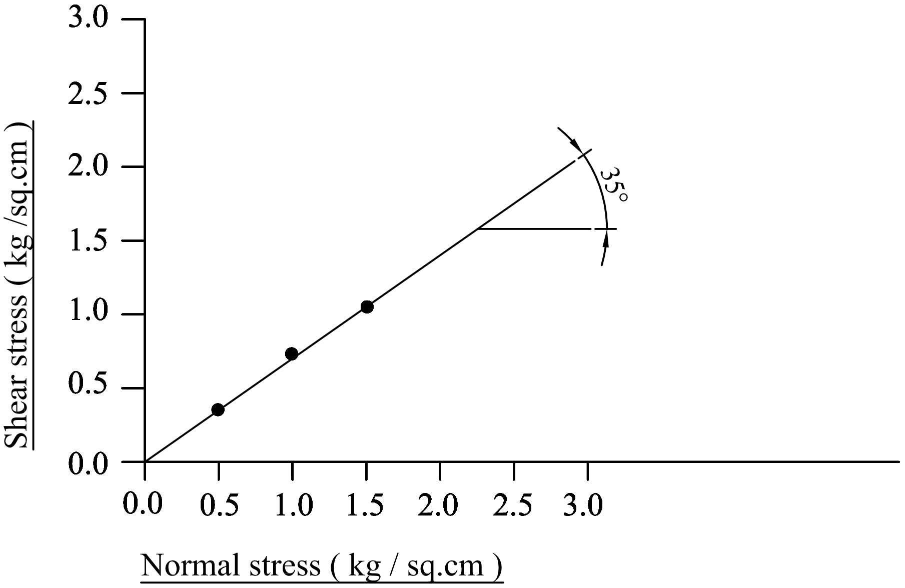
BH	GT 26	Depth(m.)	13.50	c(kg/cm^2) =	-	φ (degree) =	35

Direct Shear Plot



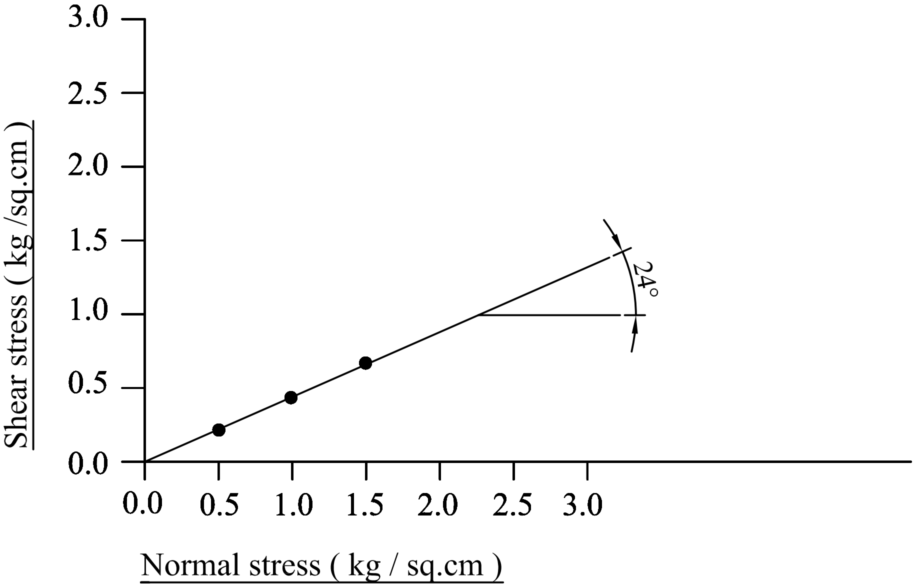
BH	GT 26	Depth(m.)	18.50	c(kg/cm^2) =	-	φ (degree) =	36

Direct Shear Plot



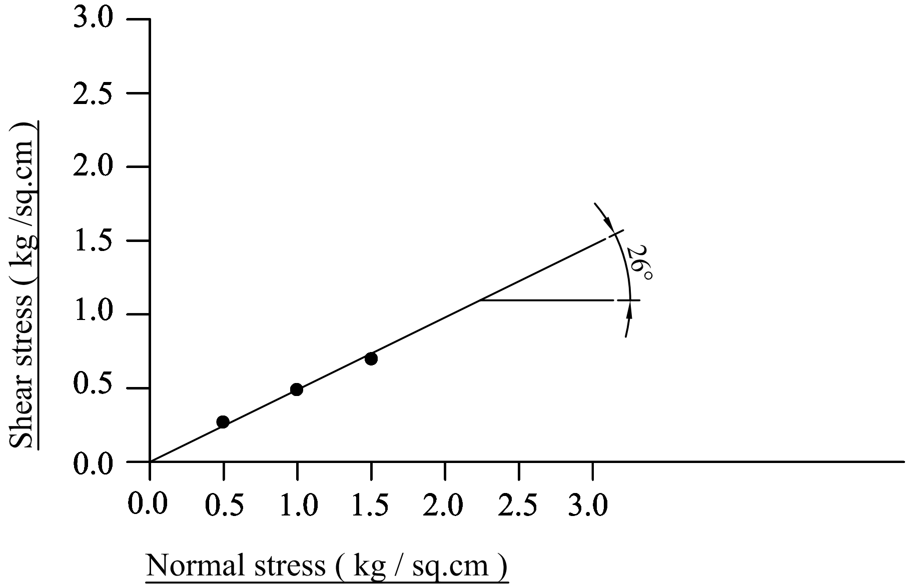
BH	GT 27	Depth(m.)	13.50	c(kg/cm²) =	-	φ (degree) =	35

Direct Shear Plot



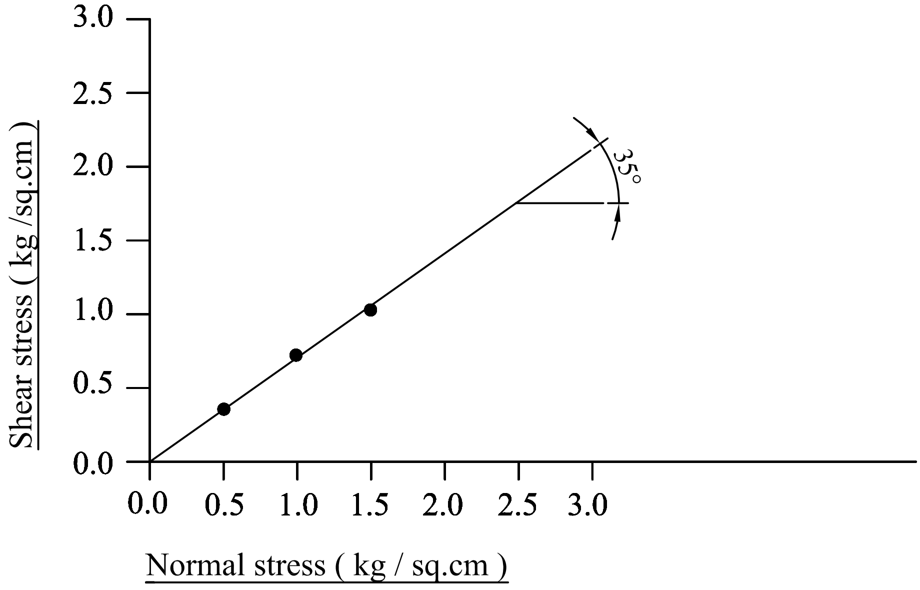
BH	GT 28	Depth(m.)	1.50	c(kg/cm²) =	-	φ (degree) =	24

Direct Shear Plot



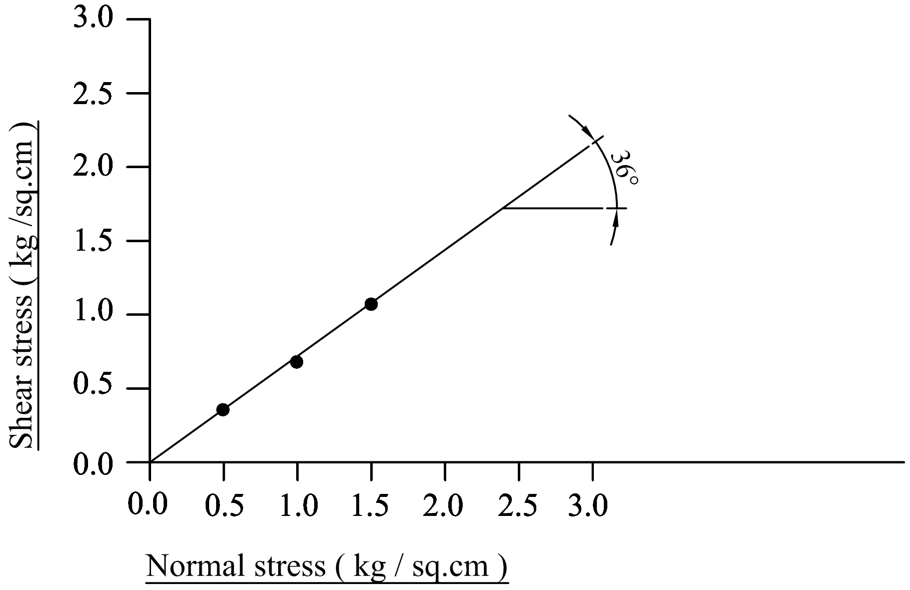
BH	GT 28	Depth(m.)	4.50	c(kg/cm²) =	-	φ (degree) =	26

Direct Shear Plot



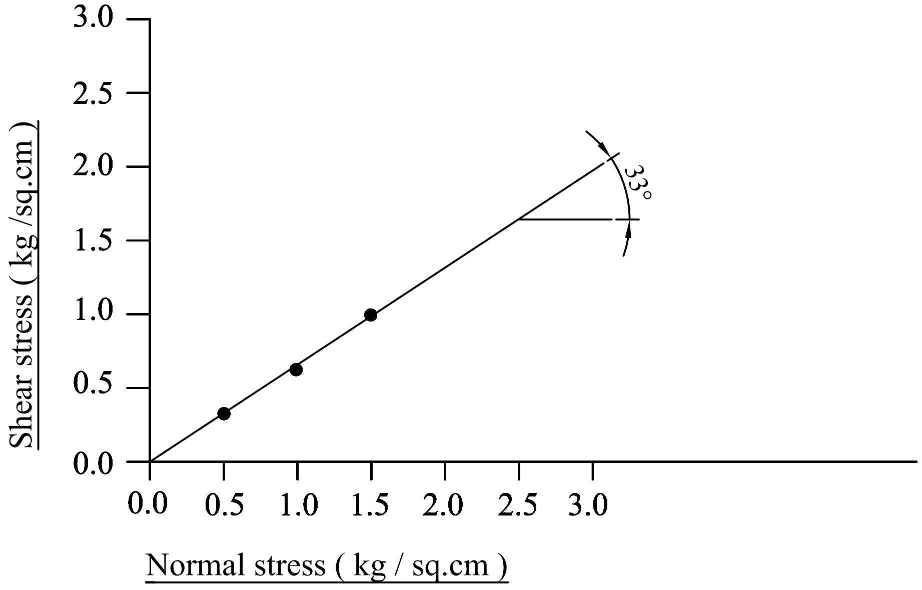
BH	GT 28	Depth(m.)	7.50	c(kg/cm²) =	-	φ (degree) =	35

Direct Shear Plot



BH	GT 28	Depth(m.)	13.50	c(kg/cm^2) =	-	φ (degree) =	36

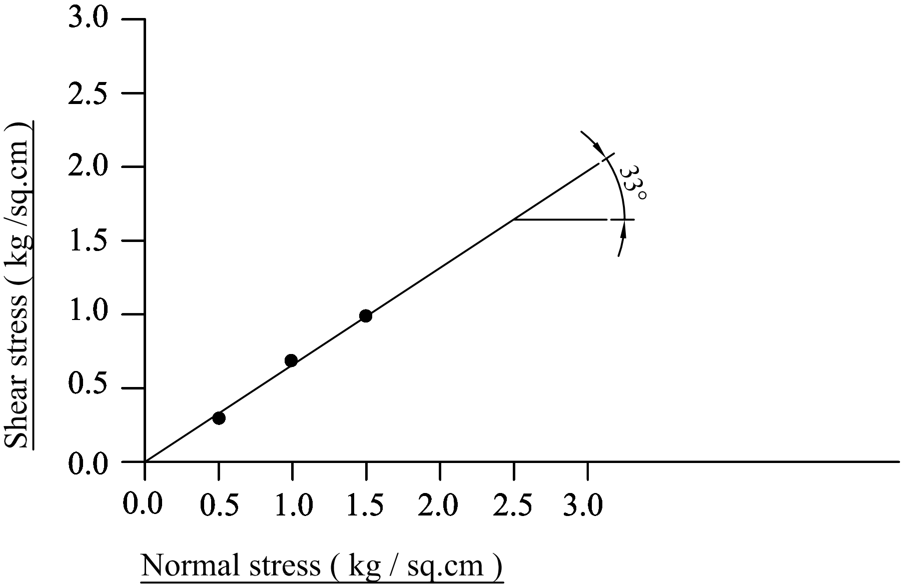
Direct Shear Plot



BH	GT 29	Depth(m.)	4.50	c(kg/cm^2) =	-	φ (degree) =	33

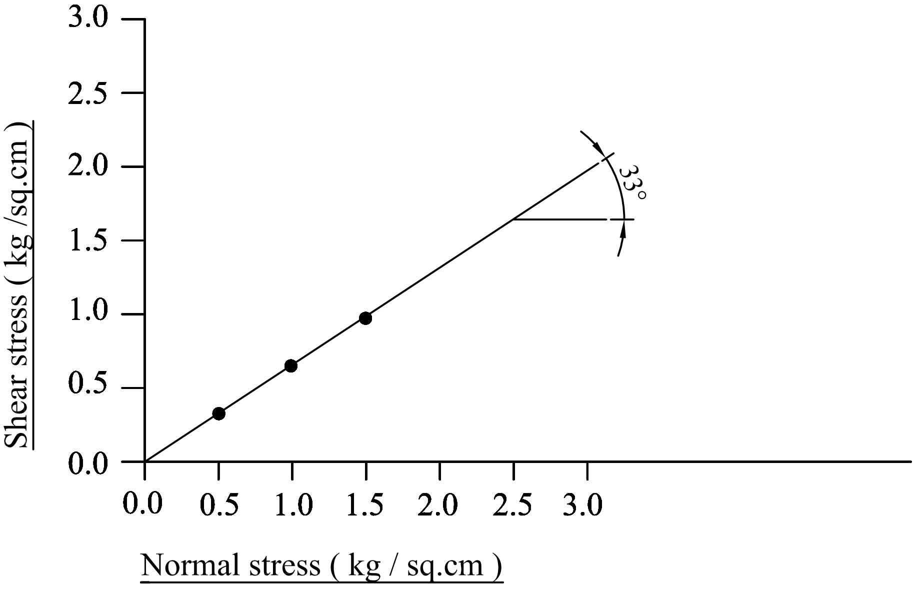
Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Direct Shear Plot



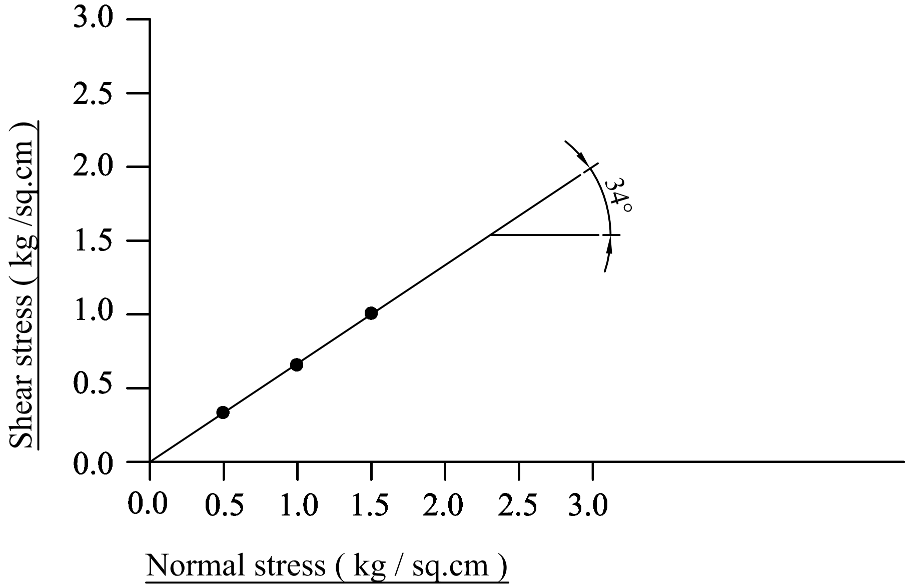
BH	GT 29	Depth(m.)	7.50	c(kg/cm^2) =	-	φ (degree) =	33

Direct Shear Plot



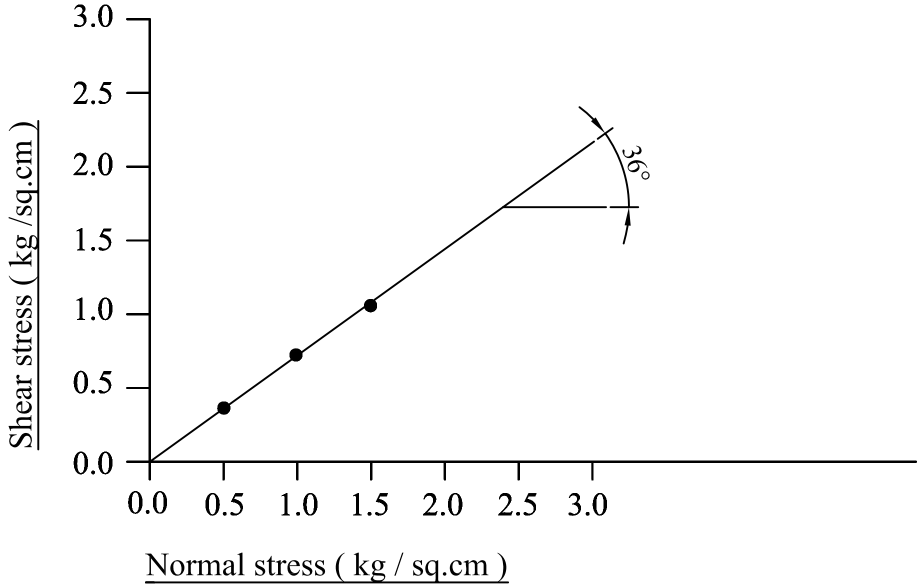
BH	GT 29	Depth(m.)	13.50	c(kg/cm^2) =	-	φ (degree) =	33

Direct Shear Plot



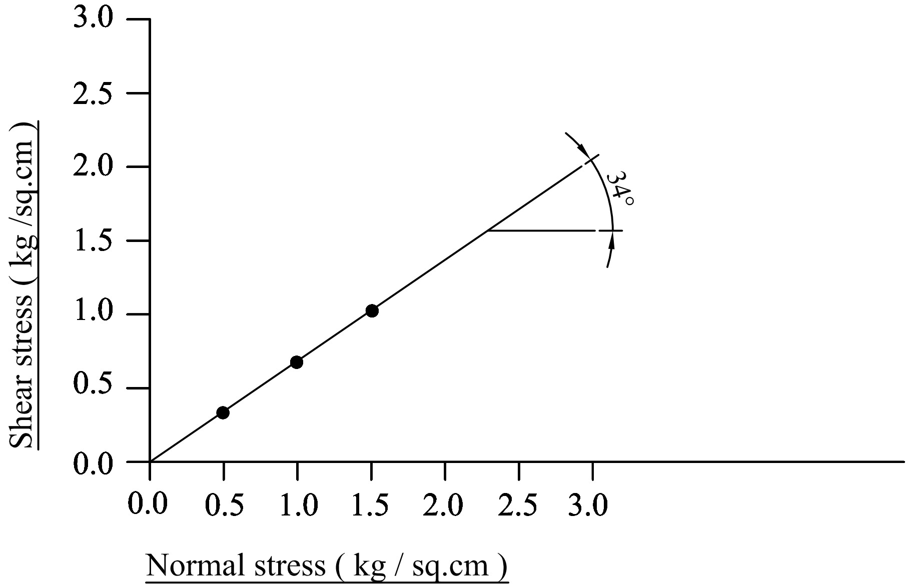
BH	GT 29	Depth(m.)	19.50	c(kg/cm²) =	-	φ (degree) =	34

Direct Shear Plot



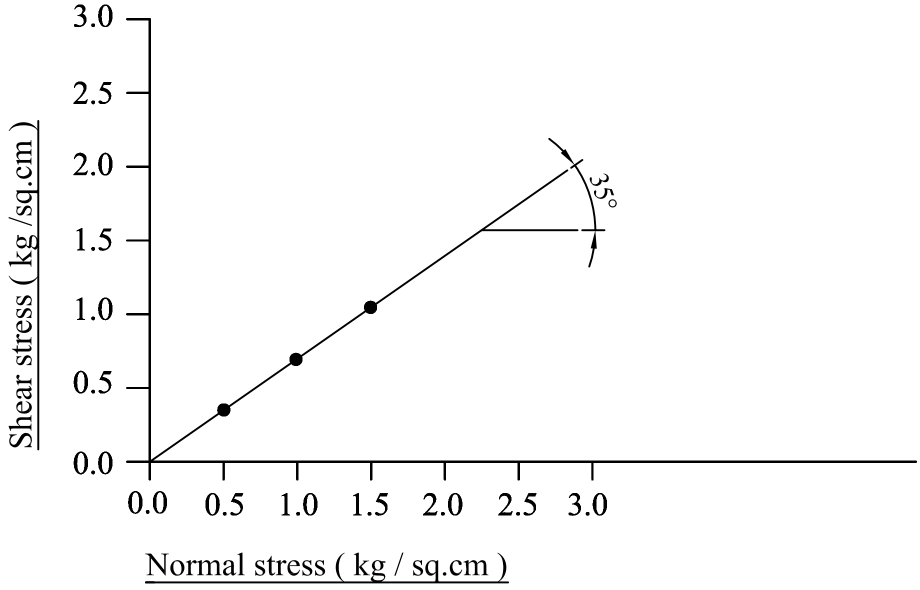
BH	GT 29	Depth(m.)	25.50	c(kg/cm²) =	-	φ (degree) =	36

Direct Shear Plot



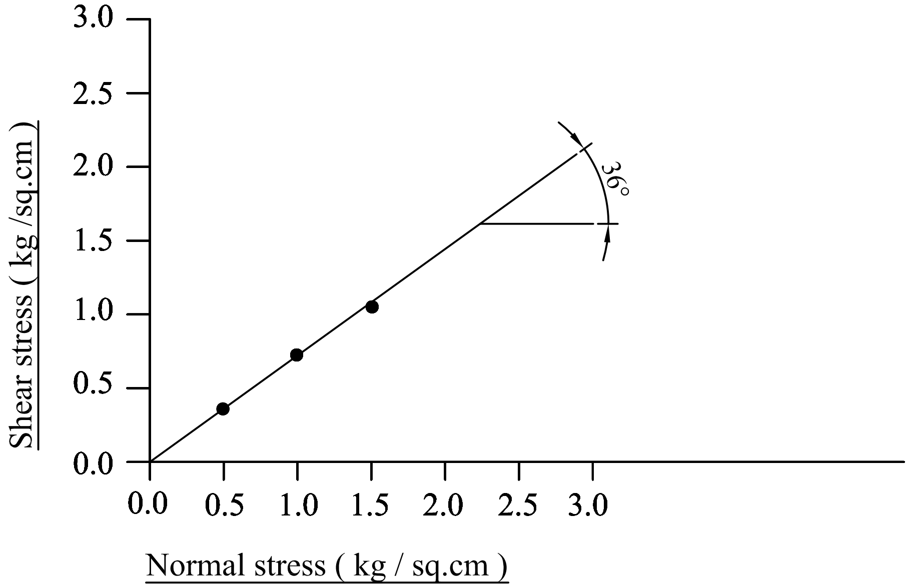
BH	GT 31	Depth(m.)	16.50	c(kg/cm^2) =	-	φ (degree) =	34

Direct Shear Plot



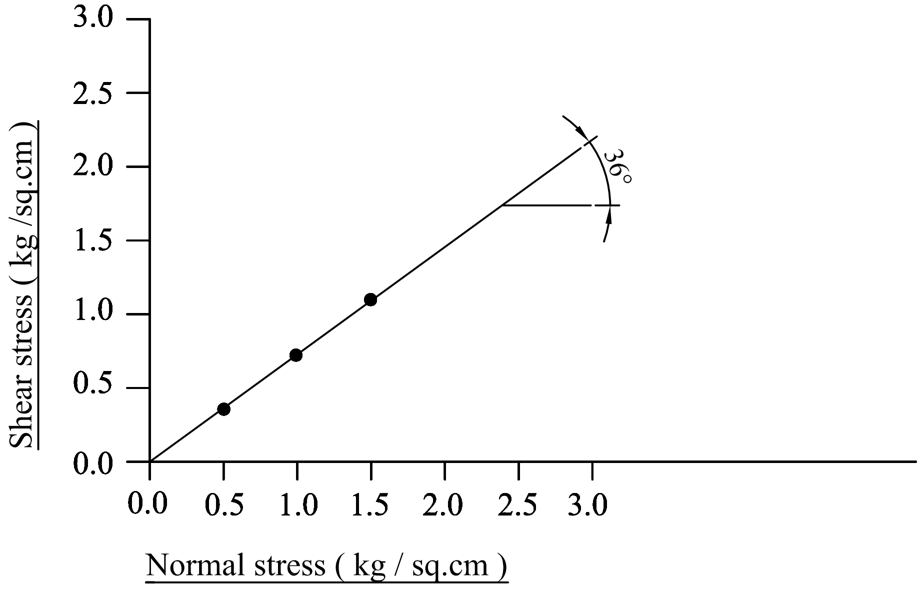
BH	GT 31	Depth(m.)	19.50	c(kg/cm^2) =	-	φ (degree) =	35

Direct Shear Plot



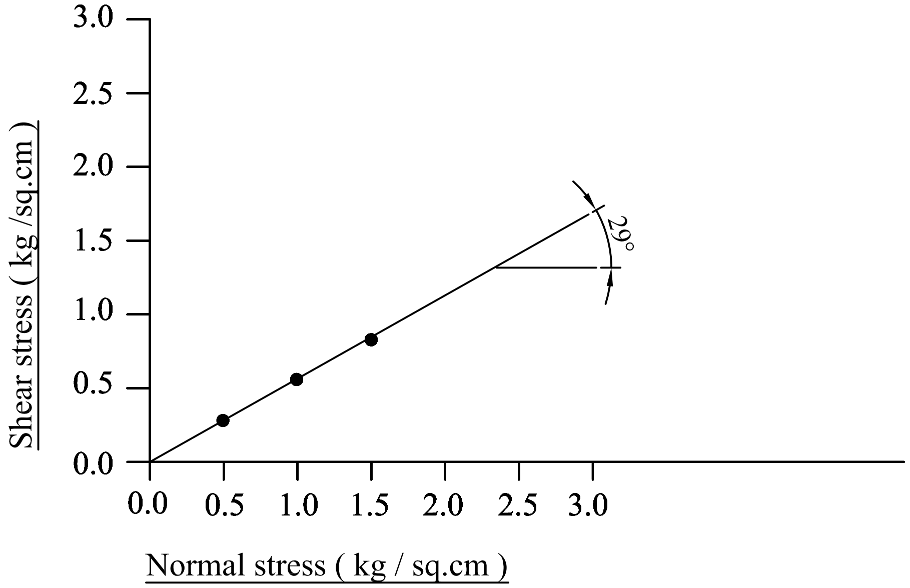
BH	GT 31	Depth(m.)	22.50	c(kg/cm²) =	-	φ (degree) =	36

Direct Shear Plot



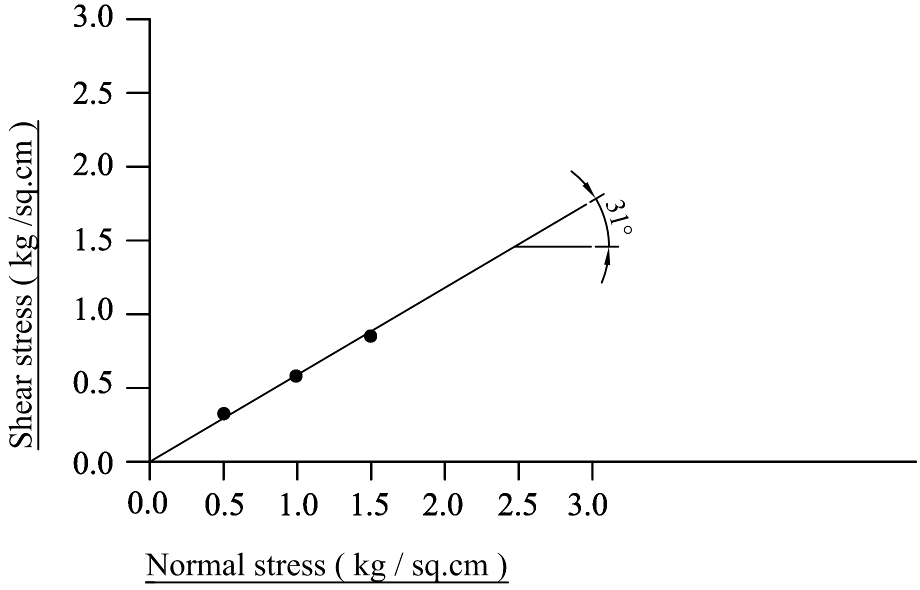
BH	GT 31	Depth(m.)	24.50	c(kg/cm²) =	-	φ (degree) =	36

Direct Shear Plot



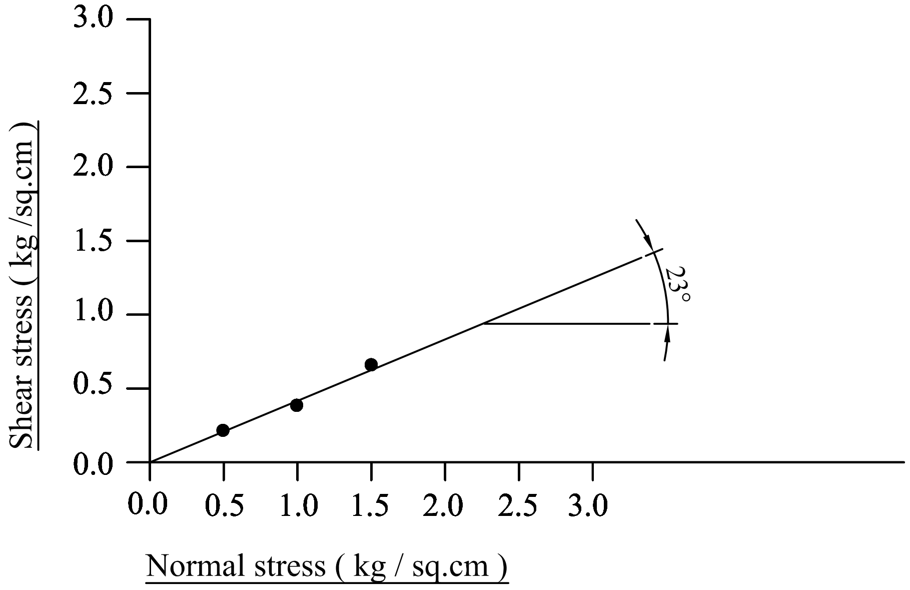
BH	GT 32	Depth(m.)	1.50	c(kg/cm^2) =	-	φ (degree) =	29

Direct Shear Plot



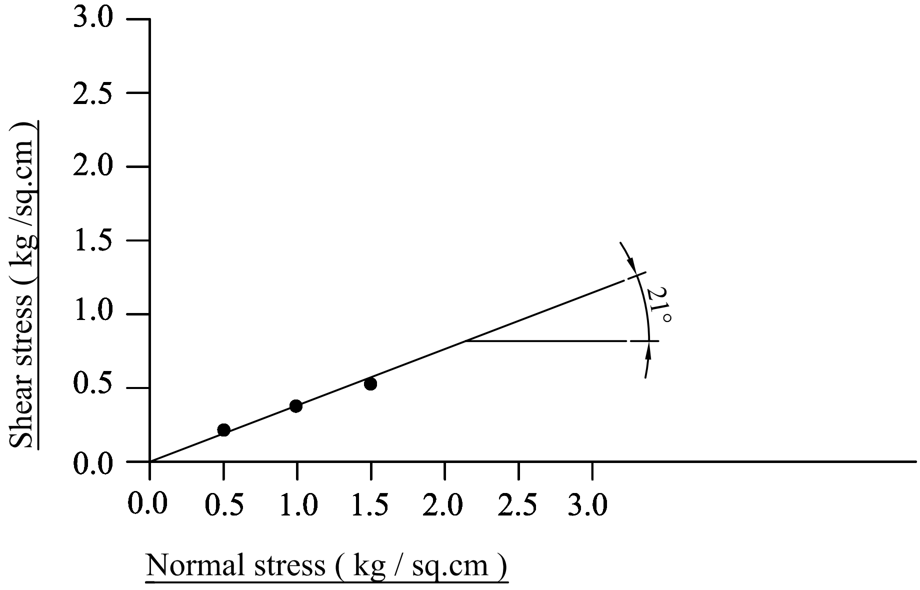
BH	GT 32	Depth(m.)	3.00	c(kg/cm^2) =	-	φ (degree) =	31

Direct Shear Plot



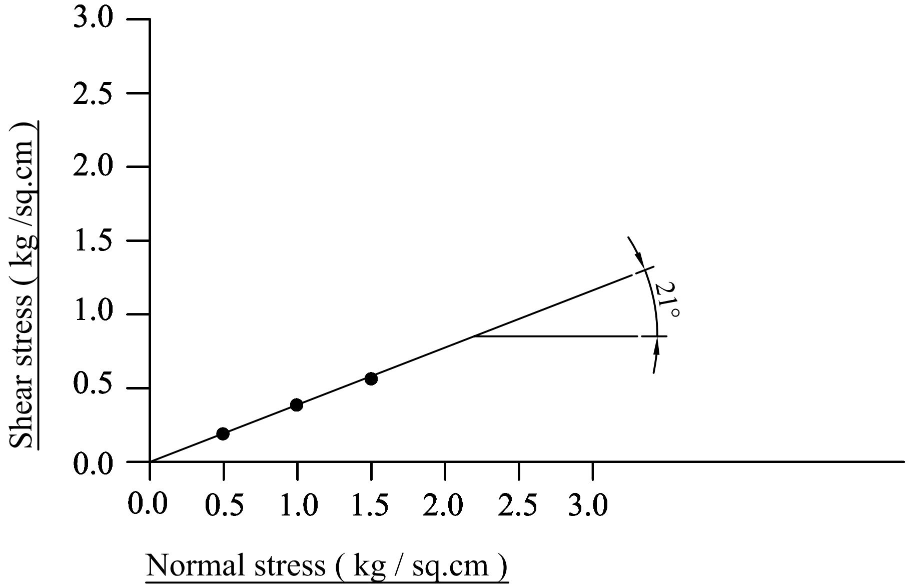
BH	GT 01	Depth(m.)	3.00	c(kg/cm^2) =	-	φ (degree) =	23

Direct Shear Plot



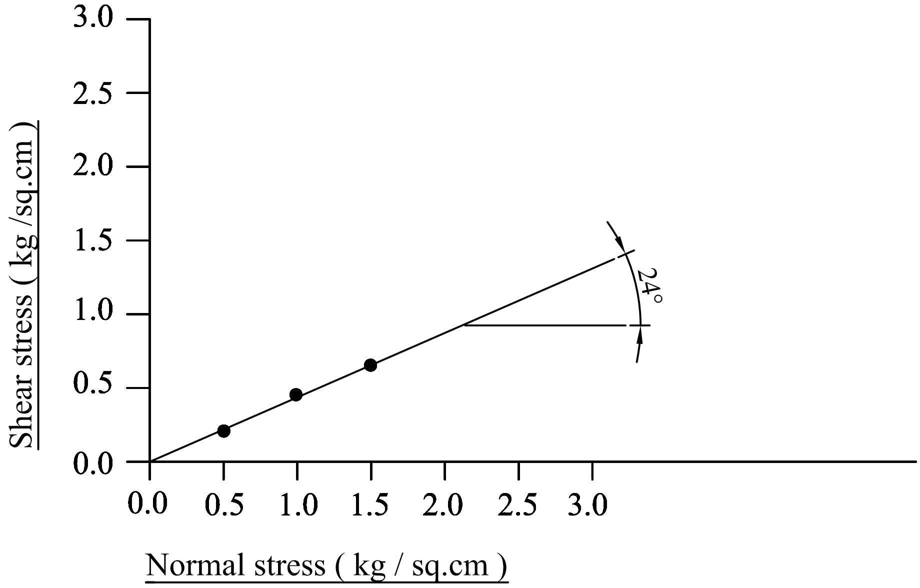
BH	GT 01	Depth(m.)	6.00	c(kg/cm^2) =	-	φ (degree) =	21

Direct Shear Plot



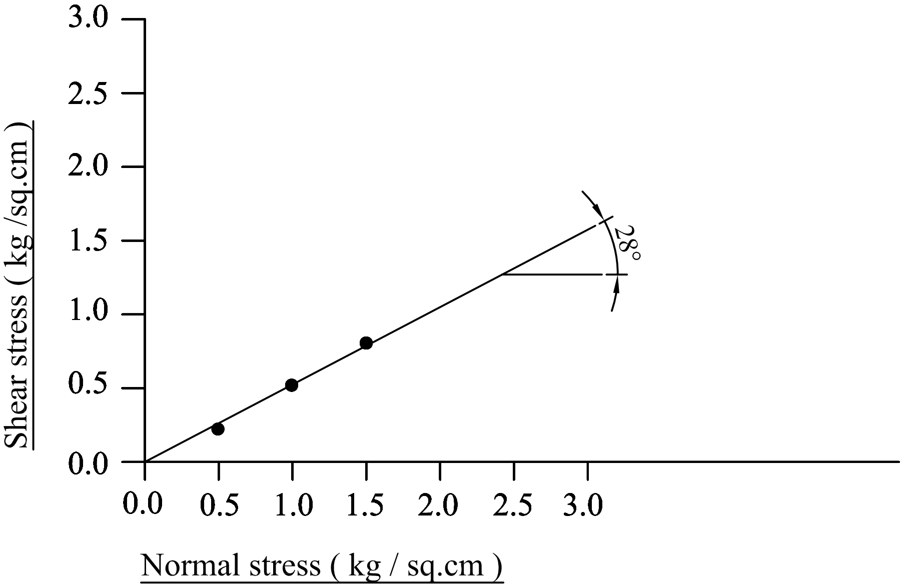
BH	GT 01	Depth(m.)	9.00	c(kg/cm²) =	-	φ (degree) =	21

Direct Shear Plot



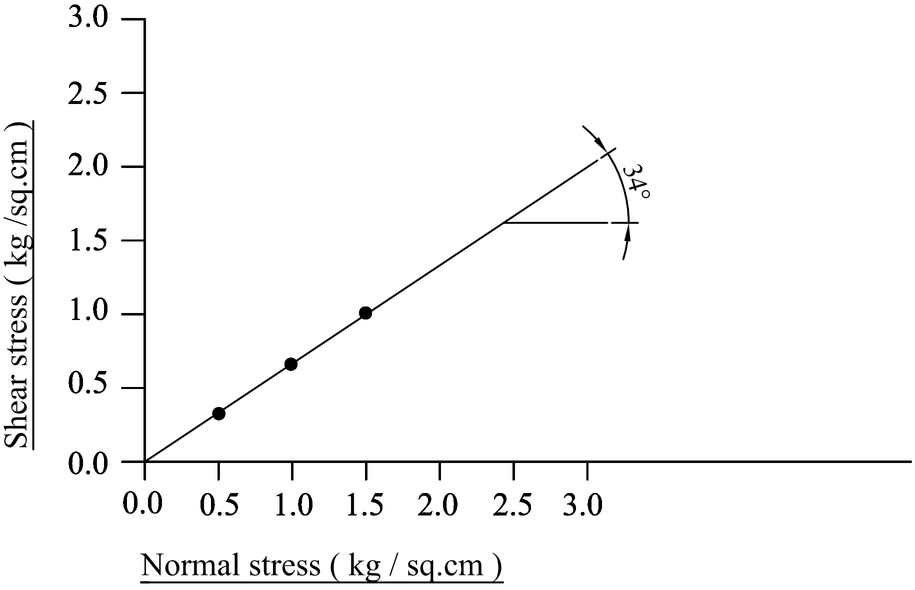
BH	GT 01	Depth(m.)	12.00	c(kg/cm²) =	-	φ (degree) =	24

Direct Shear Plot



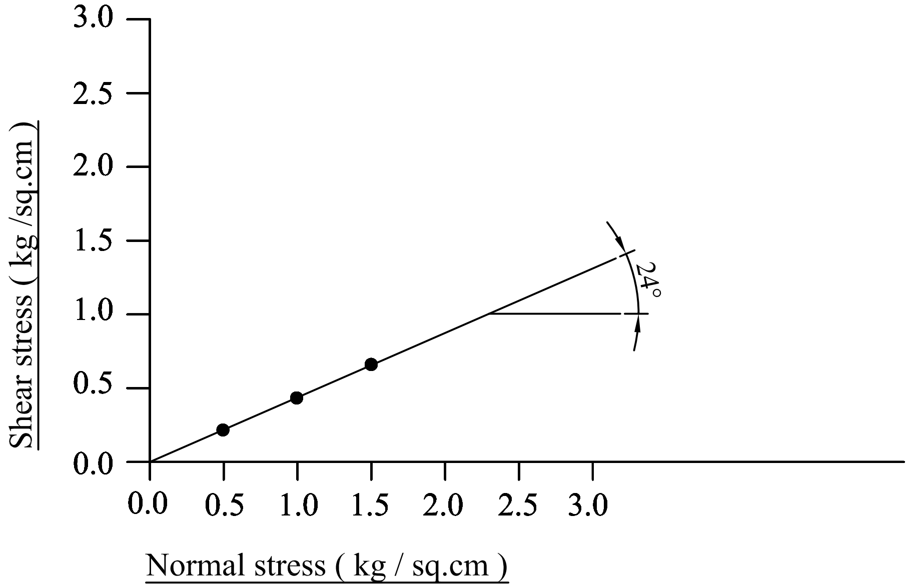
BH	GT 01	Depth(m.)	15.00	c(kg/cm^2) =	-	φ (degree) =	28

Direct Shear Plot



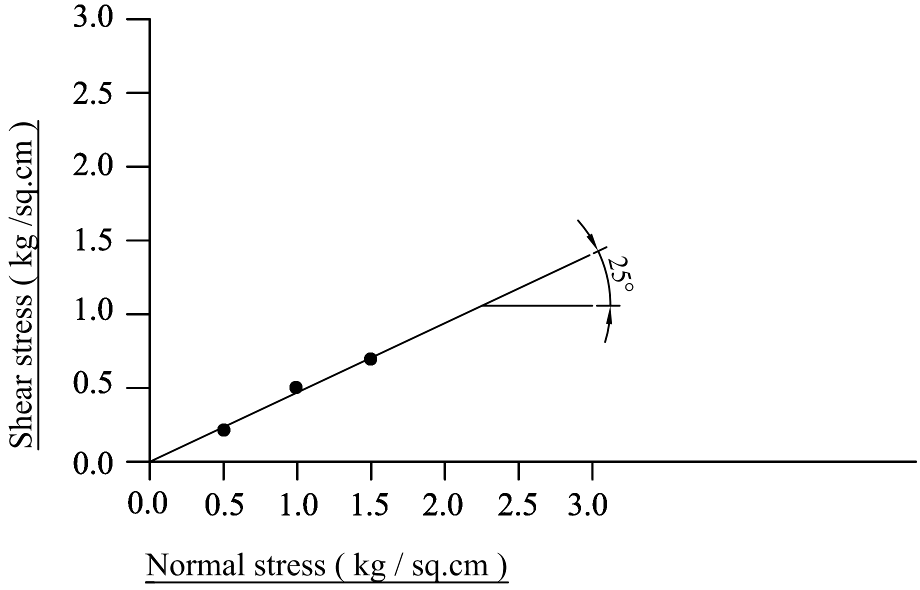
BH	GT 01	Depth(m.)	21.00	c(kg/cm^2) =	-	φ (degree) =	34

Direct Shear Plot



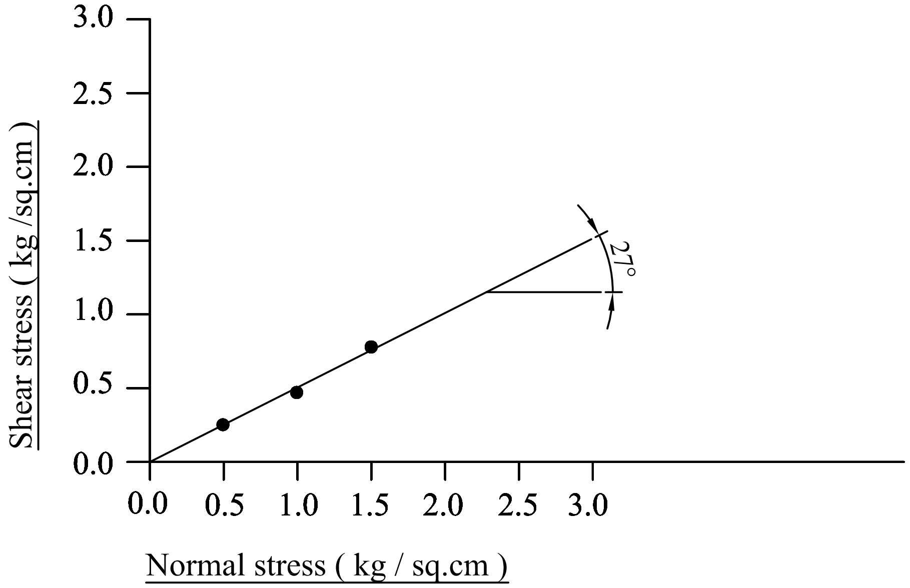
BH	GT 02	Depth(m.)	1.50	c(kg/cm^2) =	-	φ (degree) =	24

Direct Shear Plot



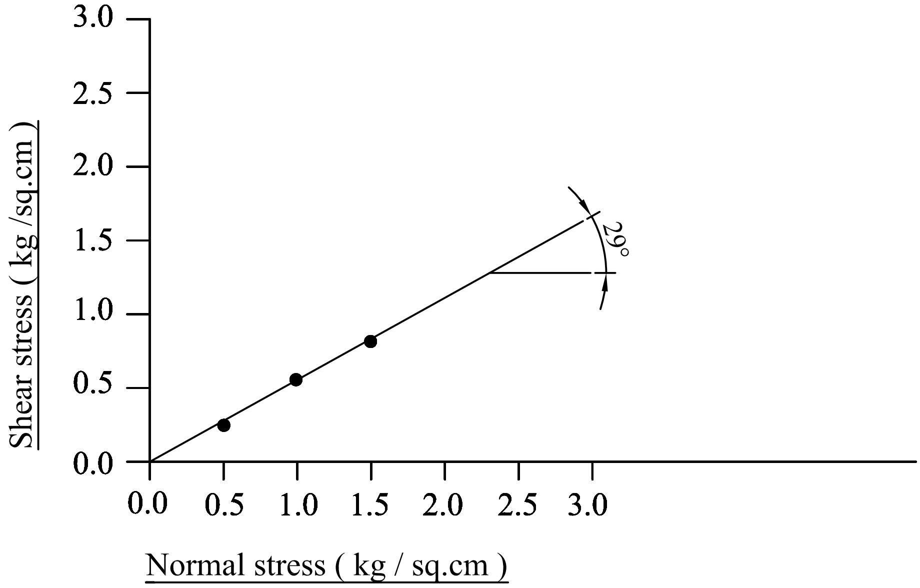
BH	GT 02	Depth(m.)	4.50	c(kg/cm^2) =	-	φ (degree) =	25

Direct Shear Plot



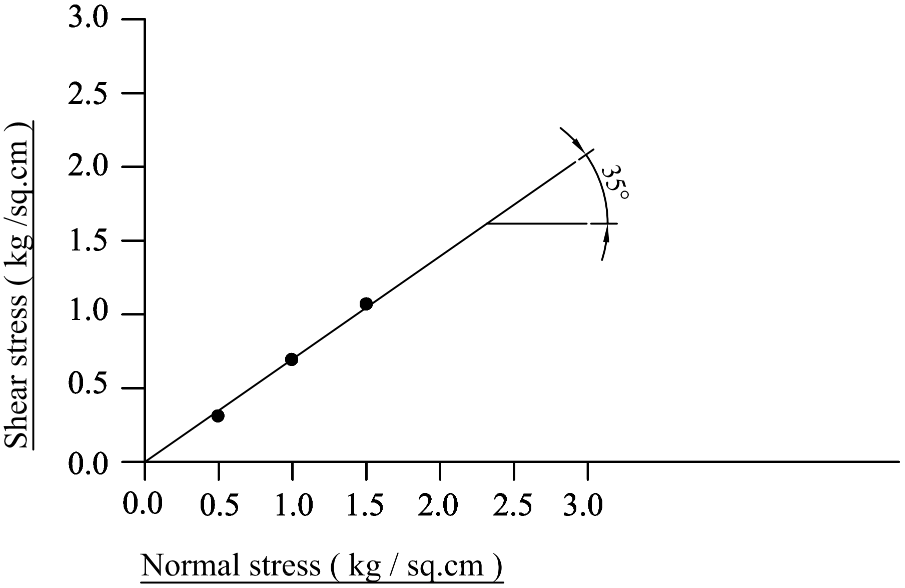
BH	GT 02	Depth(m.)	7.50	c(kg/cm²) =	-	φ (degree) =	27

Direct Shear Plot



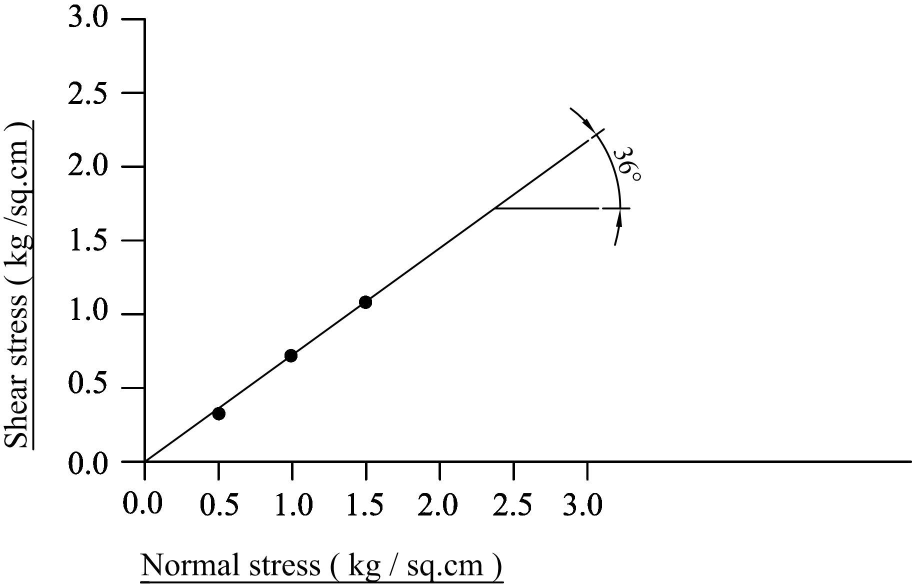
BH	GT 02	Depth(m.)	13.50	c(kg/cm²) =	-	φ (degree) =	29

Direct Shear Plot



BH	GT 02	Depth(m.)	16.50	c(kg/cm^2) =	-	φ (degree) =	35

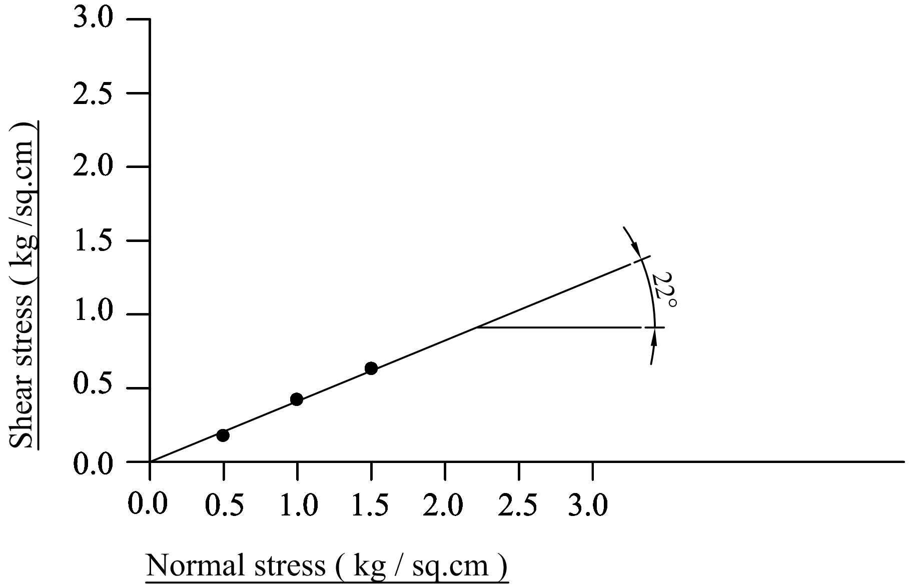
Direct Shear Plot



BH	GT 02	Depth(m.)	21.50	c(kg/cm^2) =	-	φ (degree) =	36

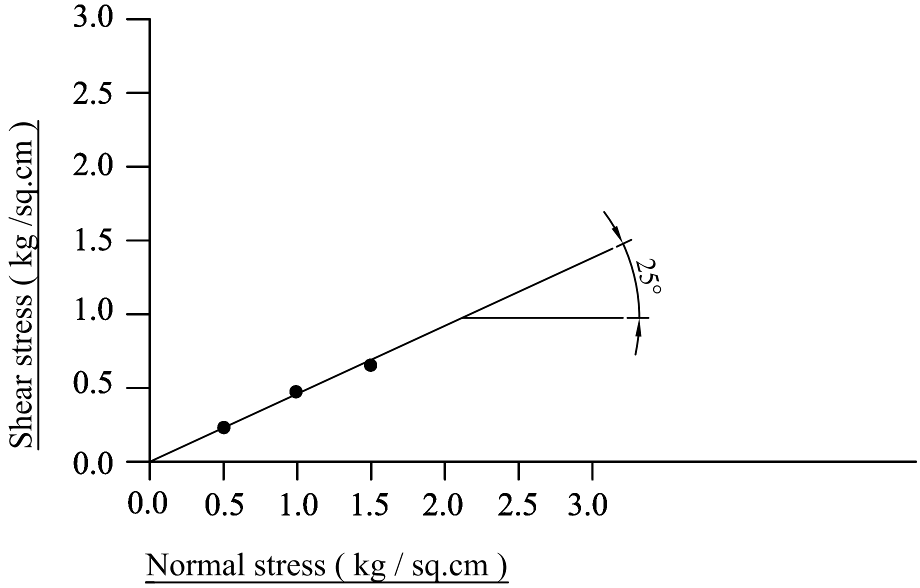
Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Direct Shear Plot



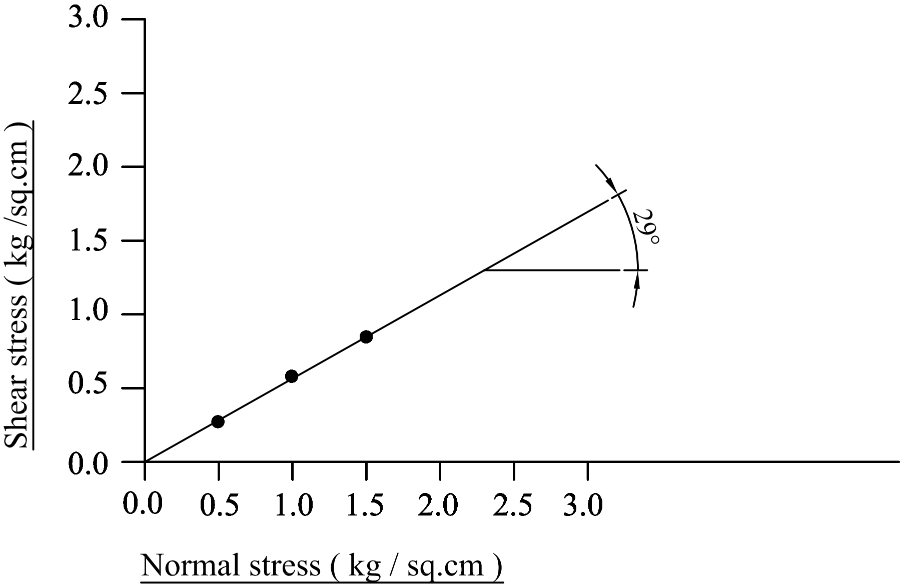
BH	GT 04	Depth(m.)	1.50	c(kg/cm^2) =	-	φ (degree) =	22

Direct Shear Plot



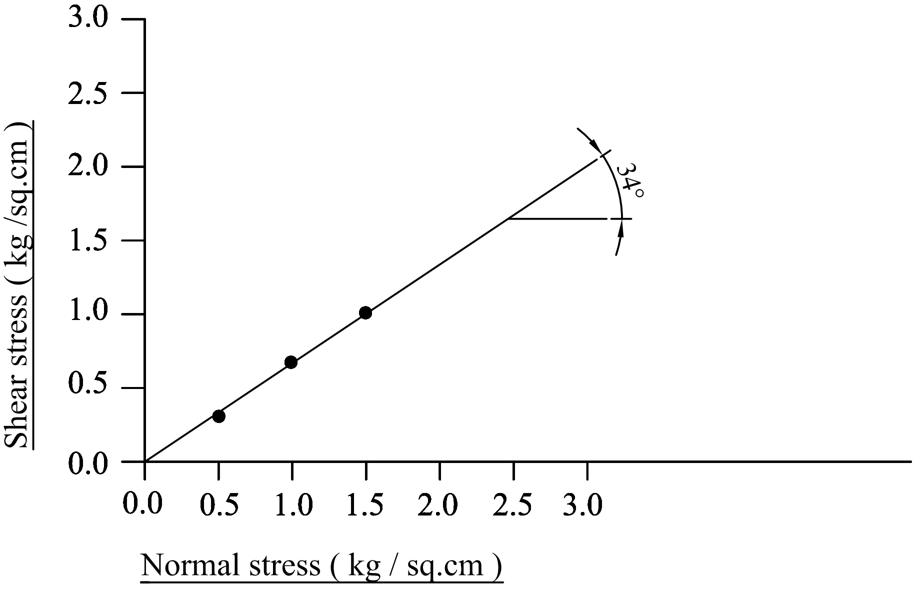
BH	GT 04	Depth(m.)	4.50	c(kg/cm^2) =	-	φ (degree) =	25

Direct Shear Plot



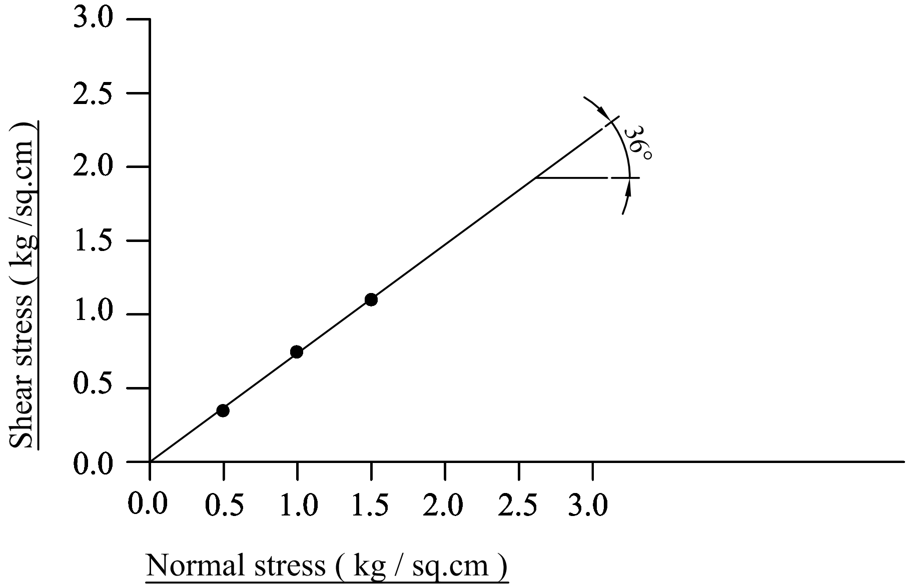
BH	GT 04	Depth(m.)	7.50	c(kg/cm^2) =	-	φ (degree) =	29

Direct Shear Plot



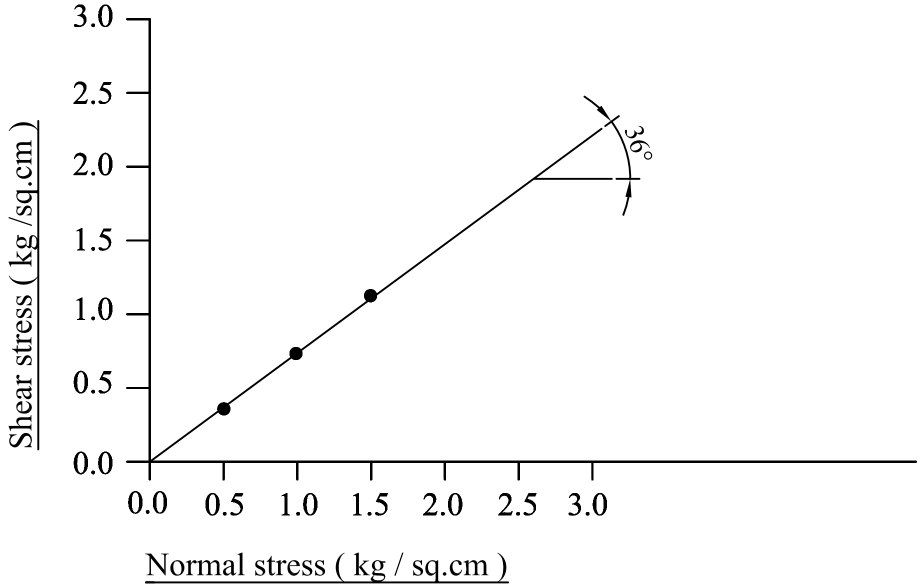
BH	GT 04	Depth(m.)	13.50	c(kg/cm^2) =	-	φ (degree) =	34

Direct Shear Plot



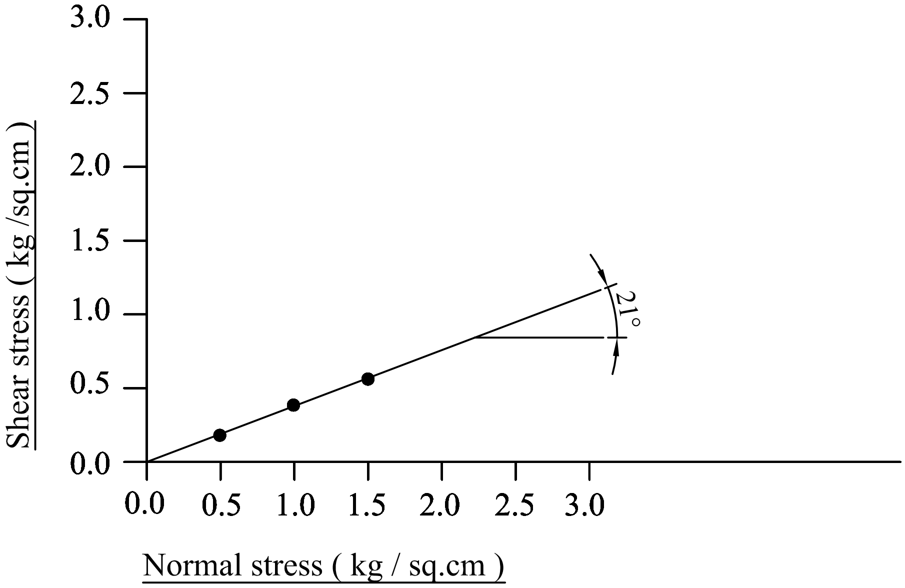
BH	GT 04	Depth(m.)	18.00	c(kg/cm²) =	-	φ (degree) =	36

Direct Shear Plot



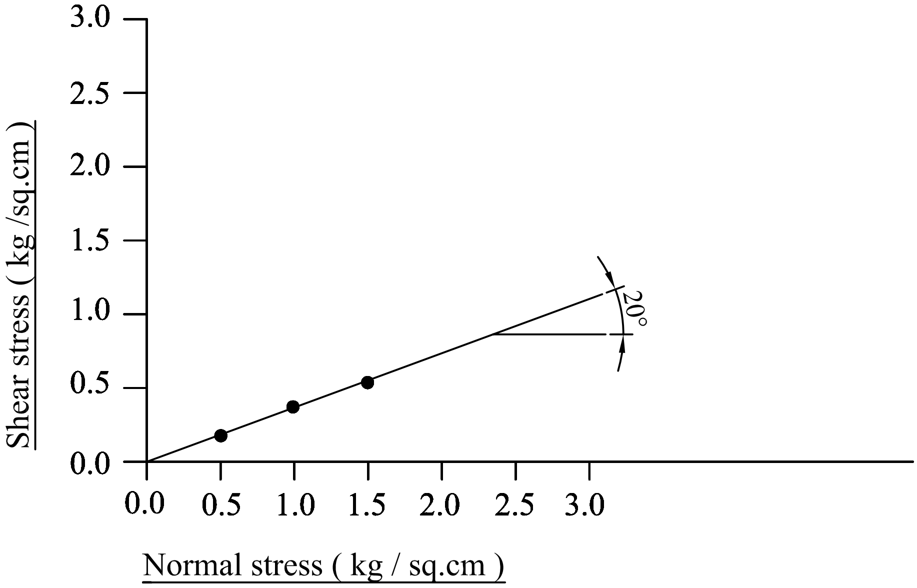
BH	GT 04	Depth(m.)	20.00	c(kg/cm²) =	-	φ (degree) =	36

Direct Shear Plot



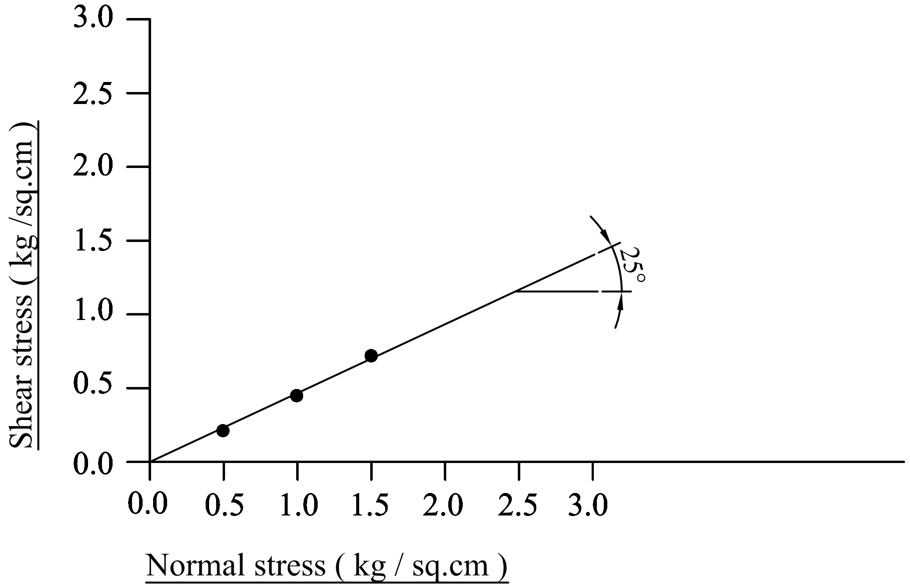
BH	GT 05	Depth(m.)	3.00	c(kg/cm^2) =	-	φ (degree) =	21

Direct Shear Plot



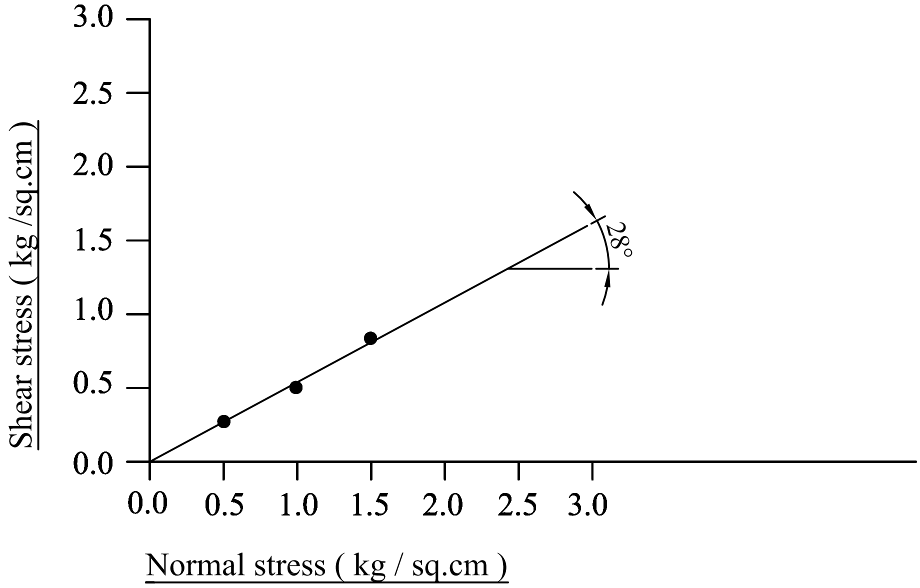
BH	GT 05	Depth(m.)	6.00	c(kg/cm^2) =	-	φ (degree) =	20

Direct Shear Plot



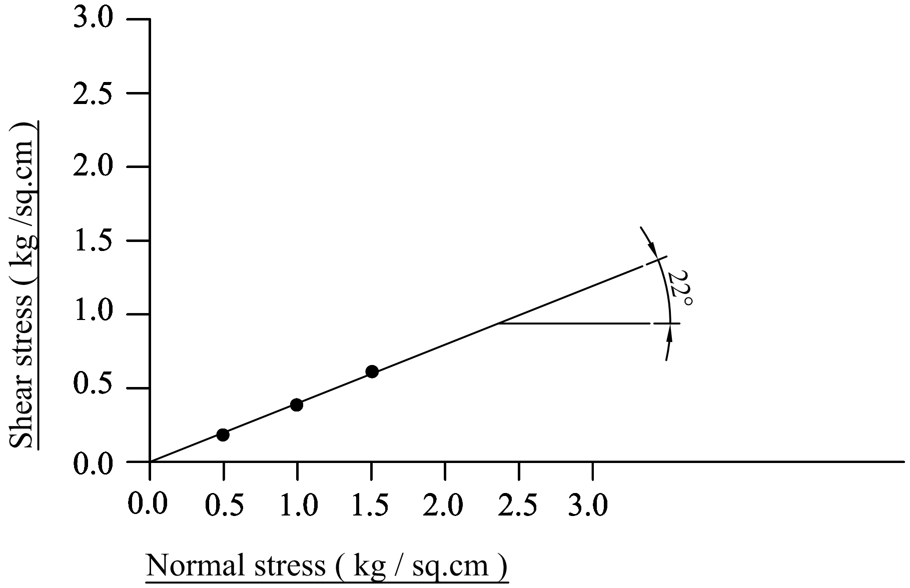
BH	GT 05	Depth(m.)	9.00	c(kg/cm²) =	-	φ (degree) =	25

Direct Shear Plot



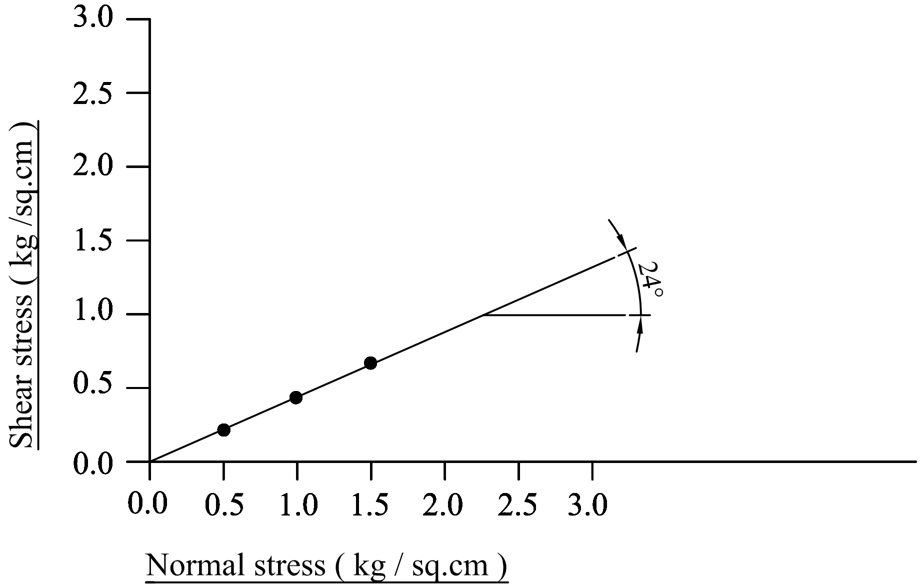
BH	GT 05	Depth(m.)	15.00	c(kg/cm²) =	-	φ (degree) =	28

Direct Shear Plot



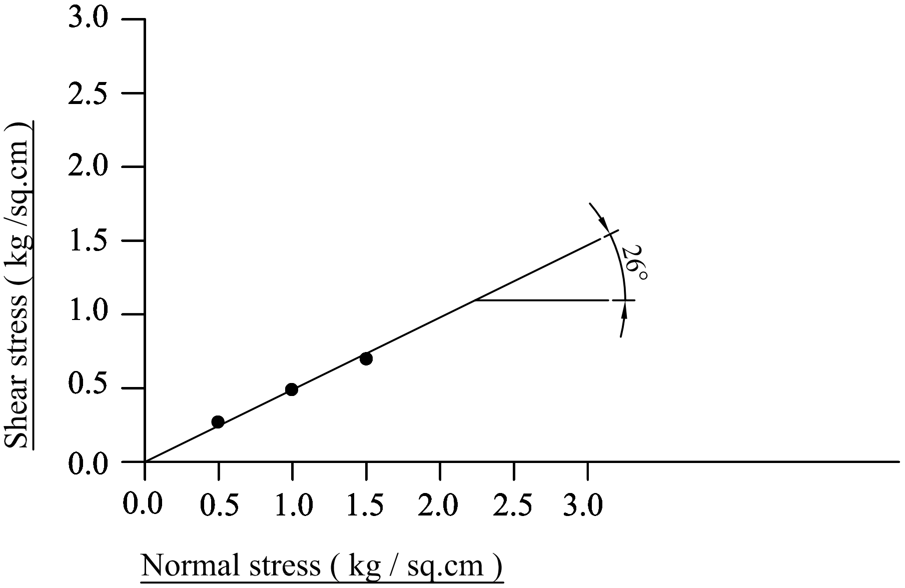
BH	GT 06	Depth(m.)	1.50	c(kg/cm²) =	-	φ (degree) =	22

Direct Shear Plot



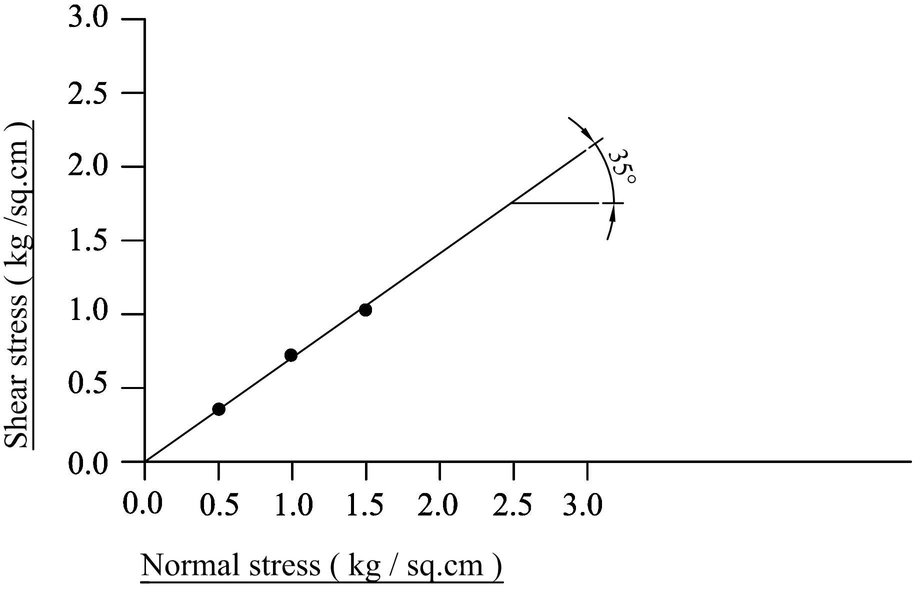
BH	GT 06	Depth(m.)	4.50	c(kg/cm²) =	-	φ (degree) =	24

Direct Shear Plot



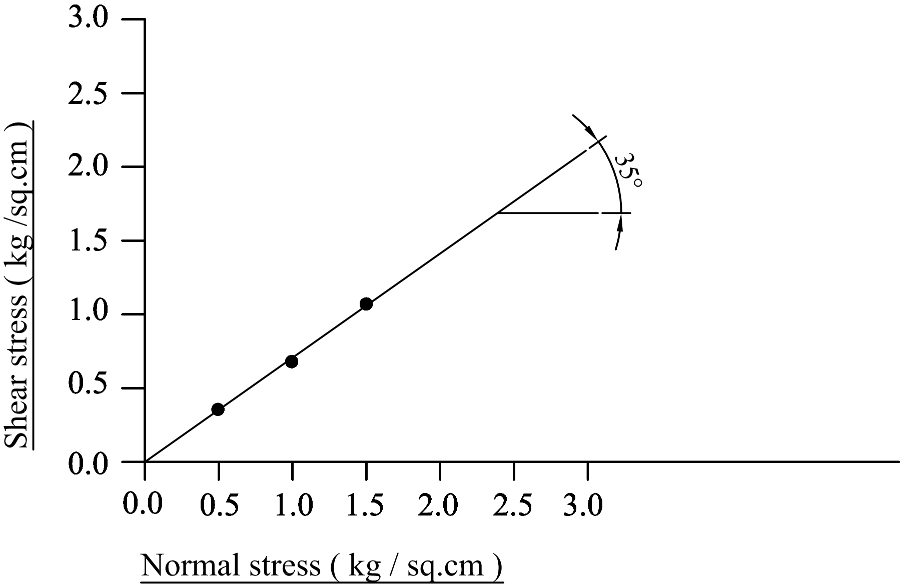
BH	GT 06	Depth(m.)	7.50	c(kg/cm^2) =	-	φ (degree) =	26

Direct Shear Plot



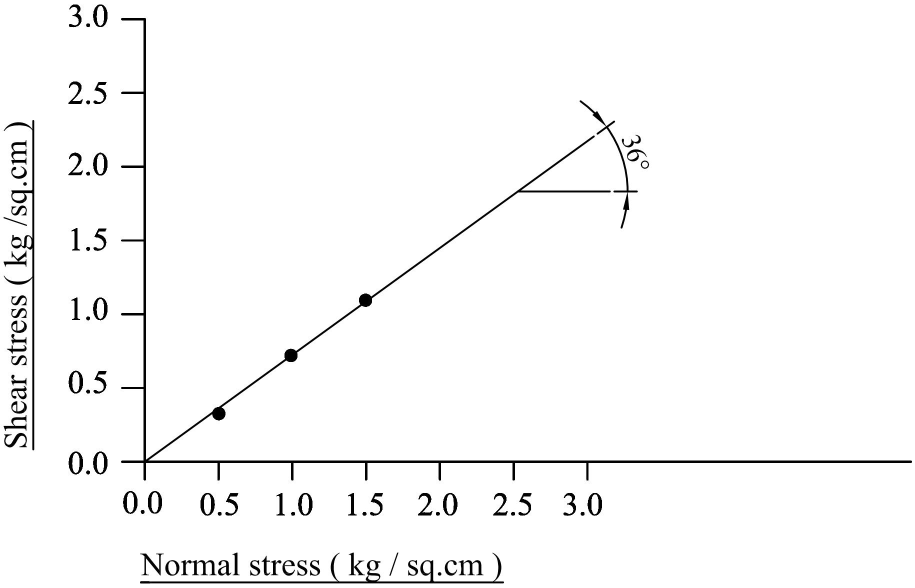
BH	GT 06	Depth(m.)	16.50	c(kg/cm^2) =	-	φ (degree) =	35

Direct Shear Plot



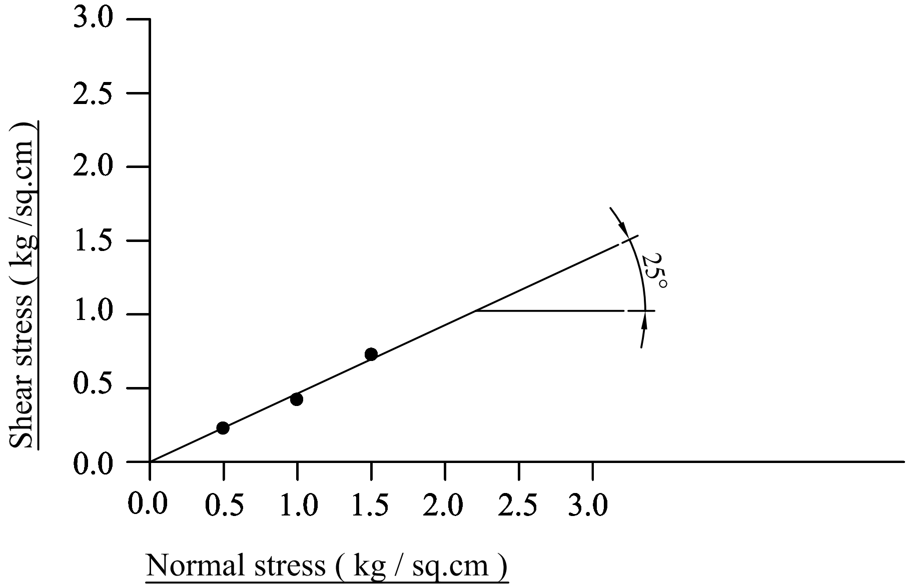
BH	GT 06	Depth(m.)	21.00	c(kg/cm²) =	-	φ (degree) =	35

Direct Shear Plot



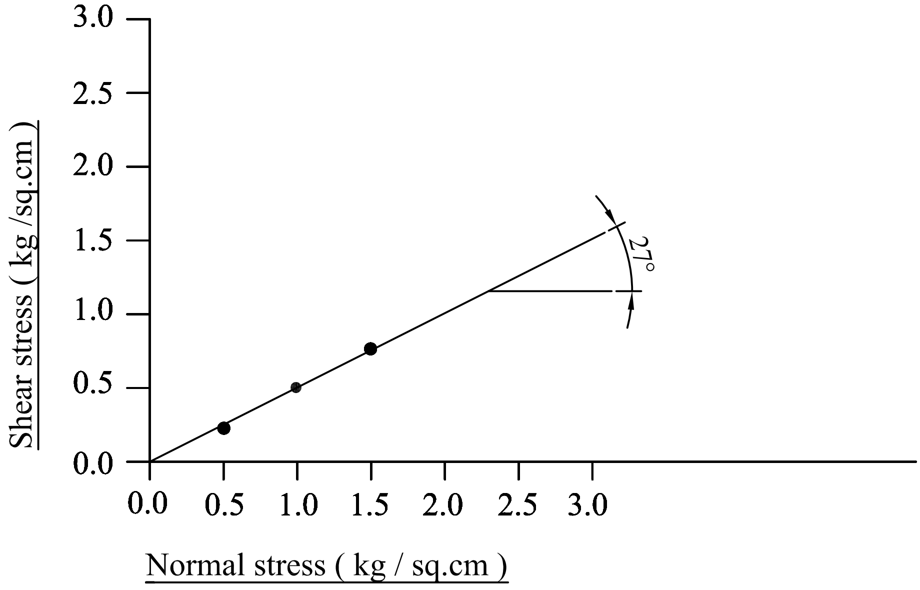
BH	GT 06	Depth(m.)	23.50	c(kg/cm²) =	-	φ (degree) =	36

Direct Shear Plot



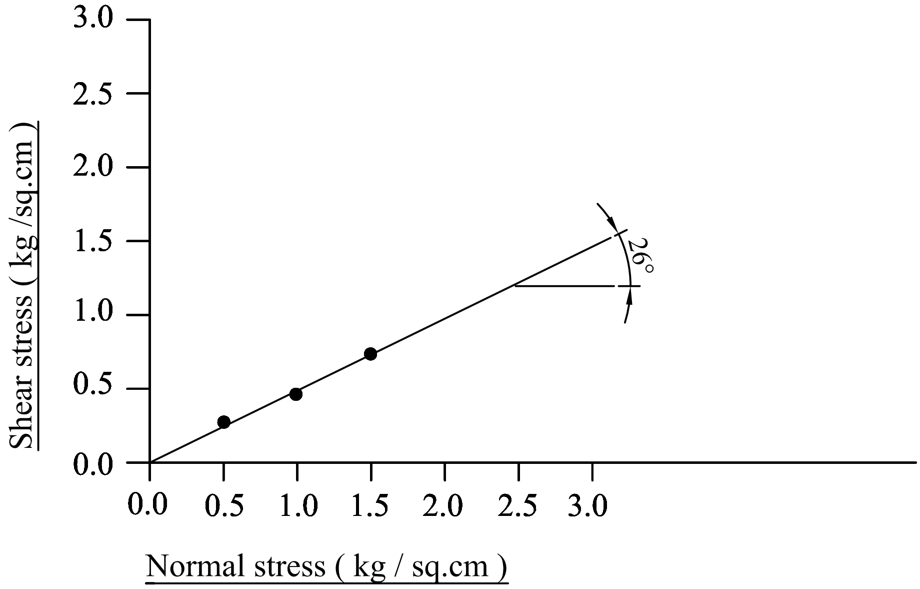
BH	GT 08	Depth(m.)	1.50	c(kg/cm²) =	-	φ (degree) =	25

Direct Shear Plot



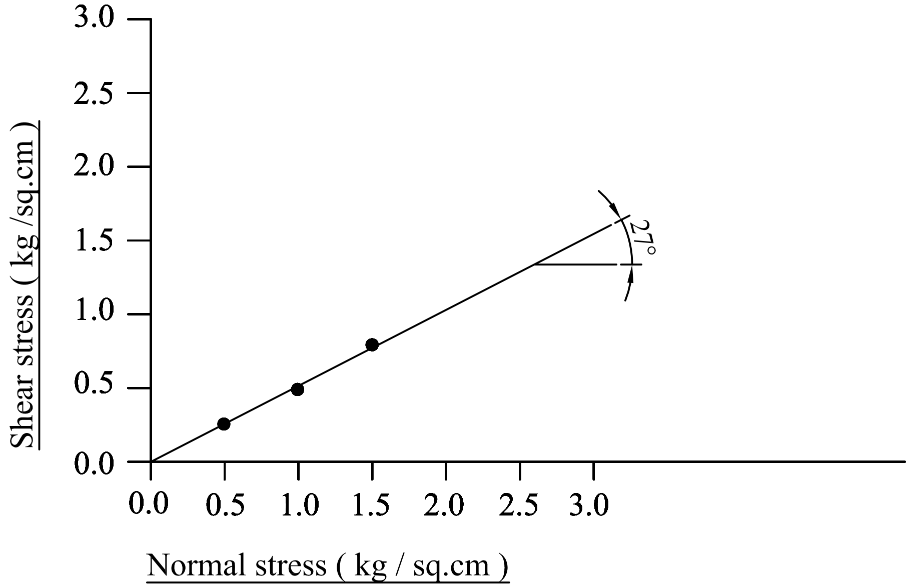
BH	GT 08	Depth(m.)	3.00	c(kg/cm²) =	-	φ (degree) =	27

Direct Shear Plot



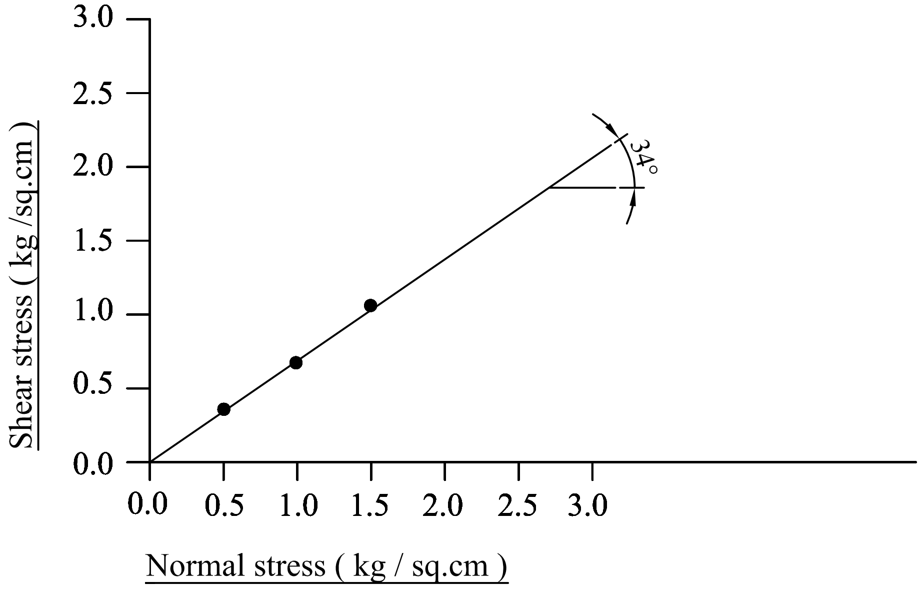
BH	GT 09	Depth(m.)	3.00	c(kg/cm^2) =	-	φ (degree) =	26

Direct Shear Plot



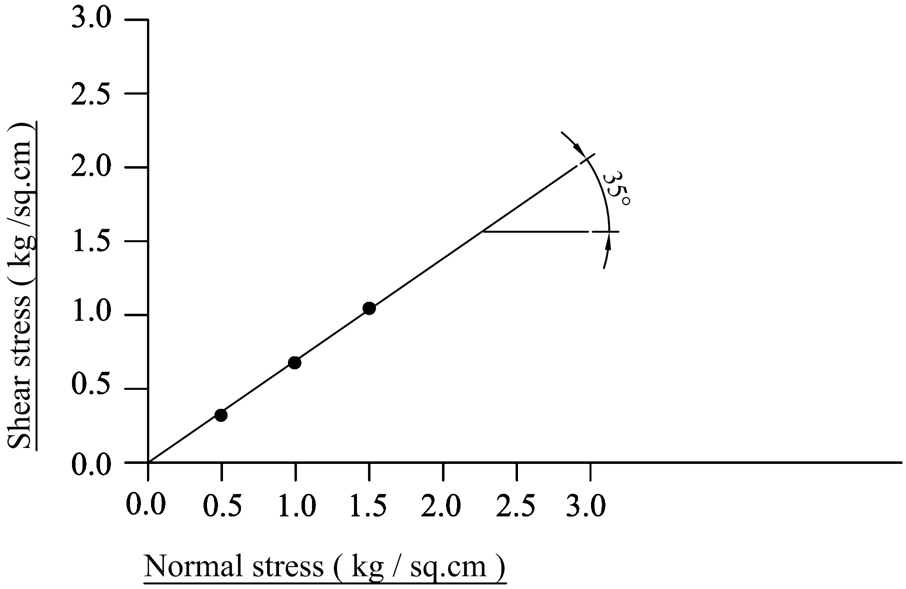
BH	GT 09	Depth(m.)	6.00	c(kg/cm^2) =	-	φ (degree) =	27

Direct Shear Plot



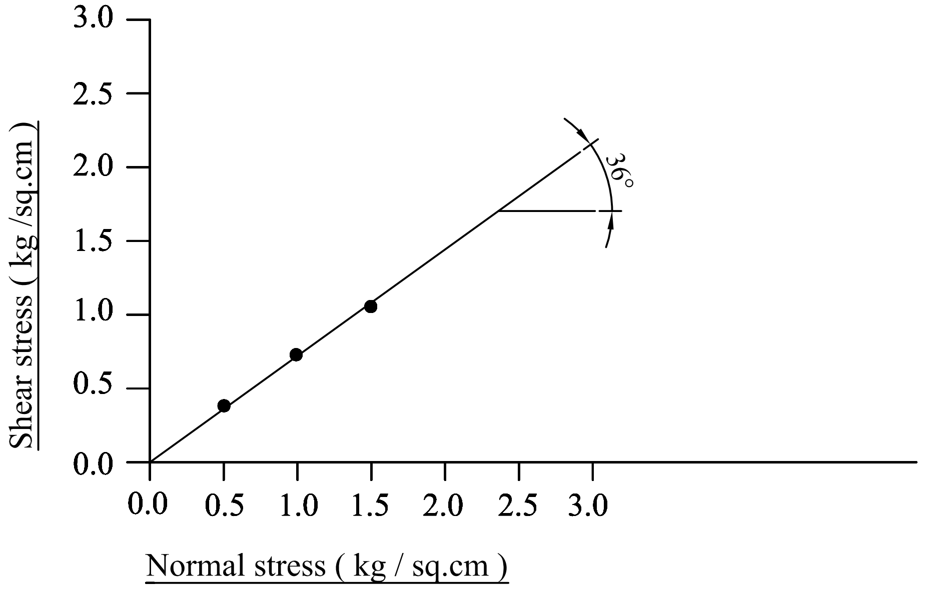
BH	GT 09	Depth(m.)	10.50	c(kg/cm^2) =	-	φ (degree) =	34

Direct Shear Plot



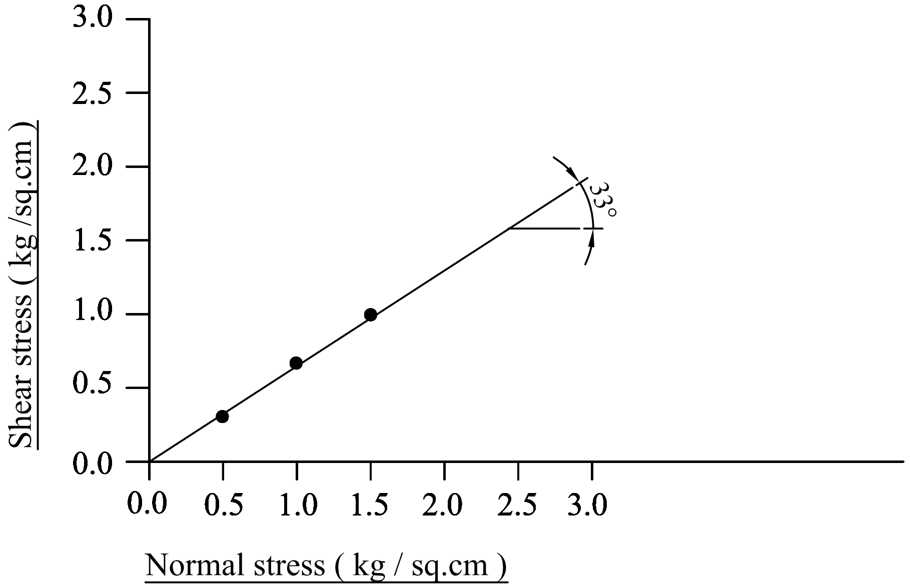
BH	GT 09	Depth(m.)	15.50	c(kg/cm^2) =	-	φ (degree) =	35

Direct Shear Plot



BH	GT 09	Depth(m.)	20.50	c(kg/cm^2) =	-	φ (degree) =	36

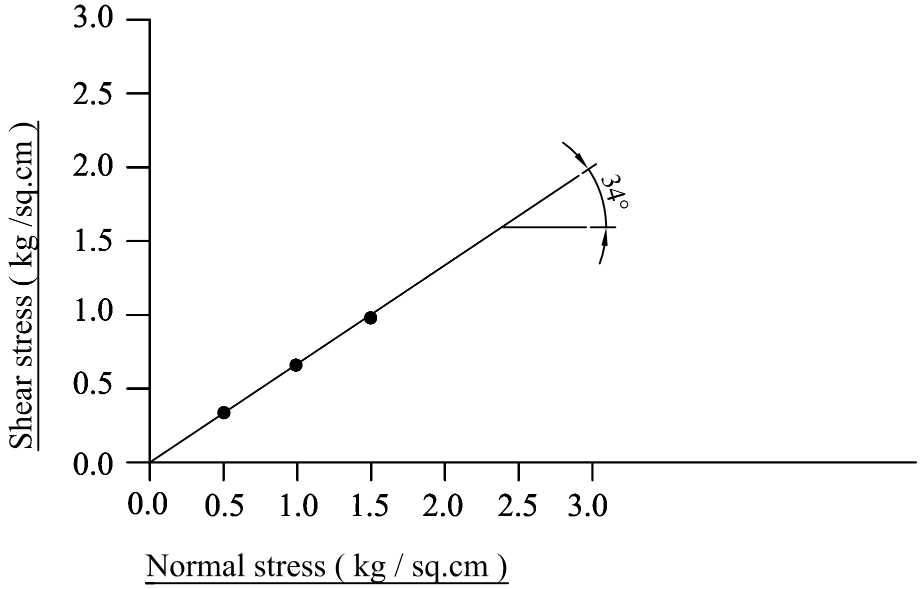
Direct Shear Plot



BH	GT 10	Depth(m.)	10.50	c(kg/cm^2) =	-	φ (degree) =	33

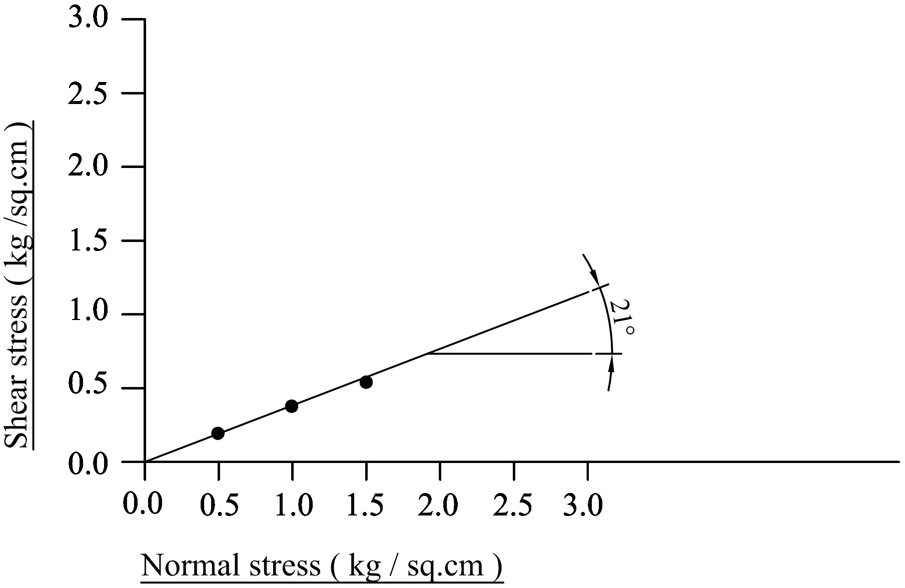
Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Direct Shear Plot



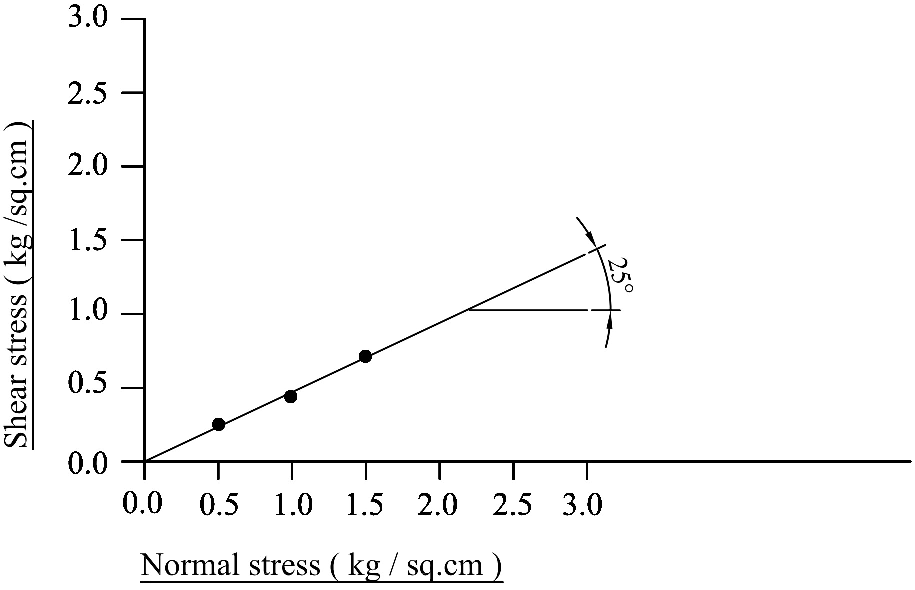
BH	GT 10	Depth(m.)	13.50	c(kg/cm²) =	-	φ (degree) =	34

Direct Shear Plot



BH	GT 12	Depth(m.)	1.50	c(kg/cm^2) =	-	φ (degree) =	21

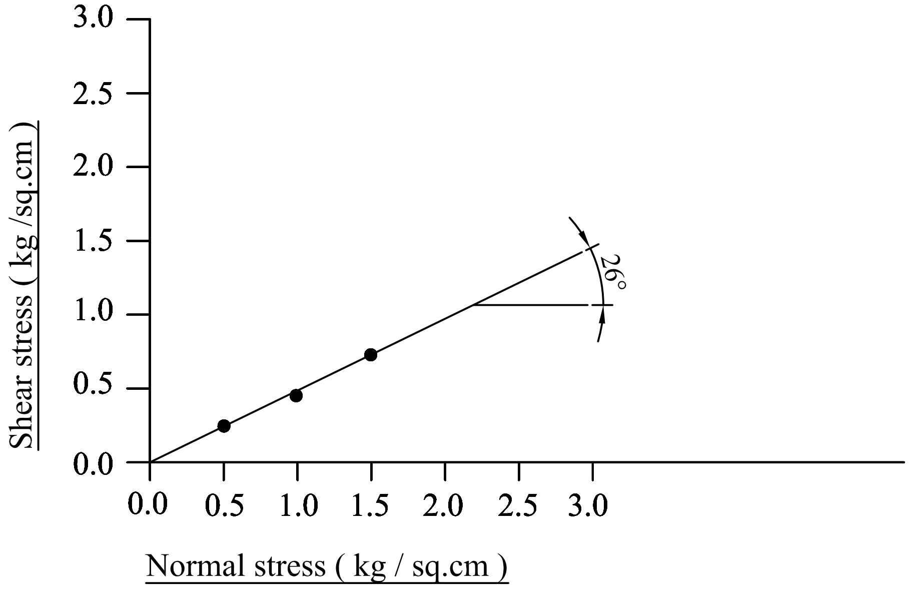
Direct Shear Plot



BH	GT 12	Depth(m.)	13.50	c(kg/cm^2) =	-	φ (degree) =	25

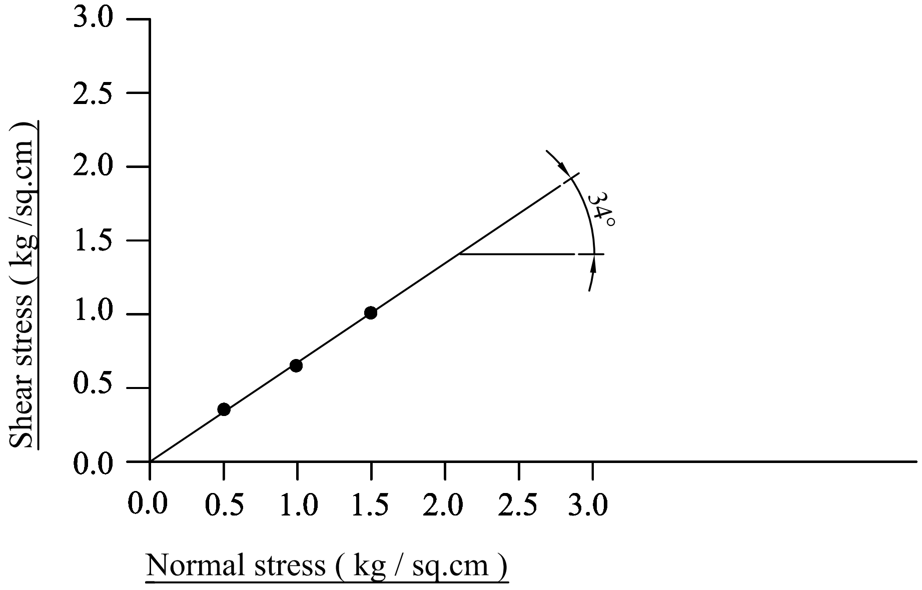
Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Direct Shear Plot



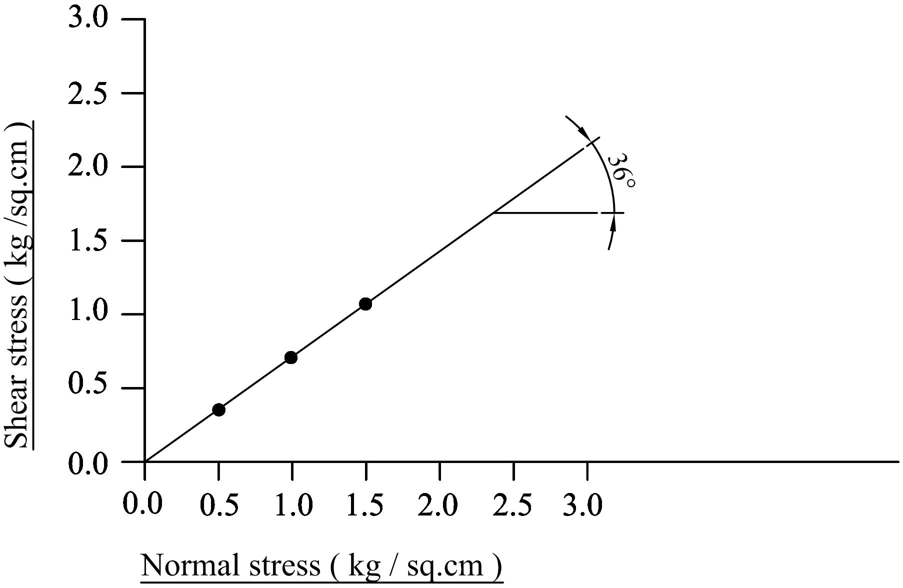
BH	GT 12	Depth(m.)	19.50	c(kg/cm^2) =	-	φ (degree) =	26

Direct Shear Plot



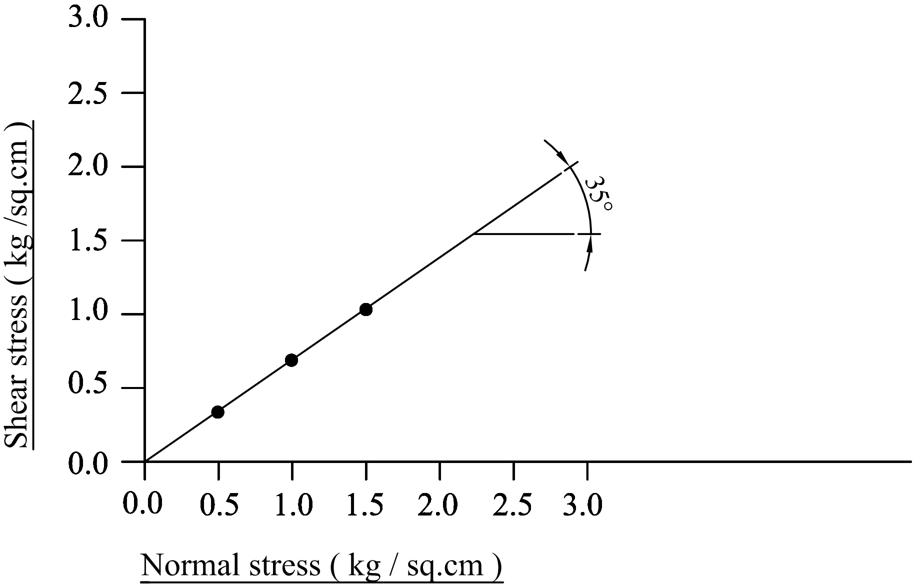
BH	GT 12	Depth(m.)	25.50	c(kg/cm^2) =	-	φ (degree) =	34

Direct Shear Plot



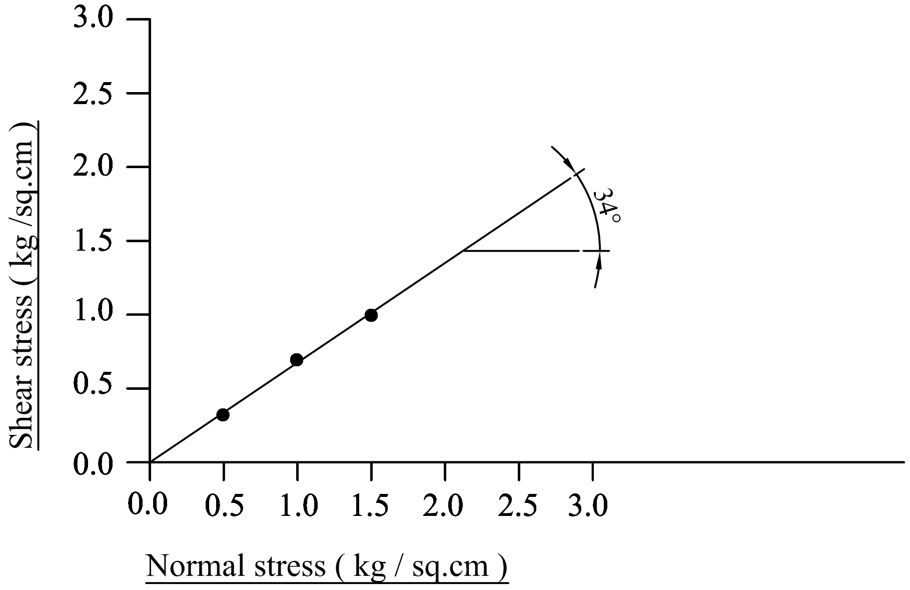
BH	GT 12	Depth(m.)	31.50	c(kg/cm^2) =	-	φ (degree) =	36

Direct Shear Plot



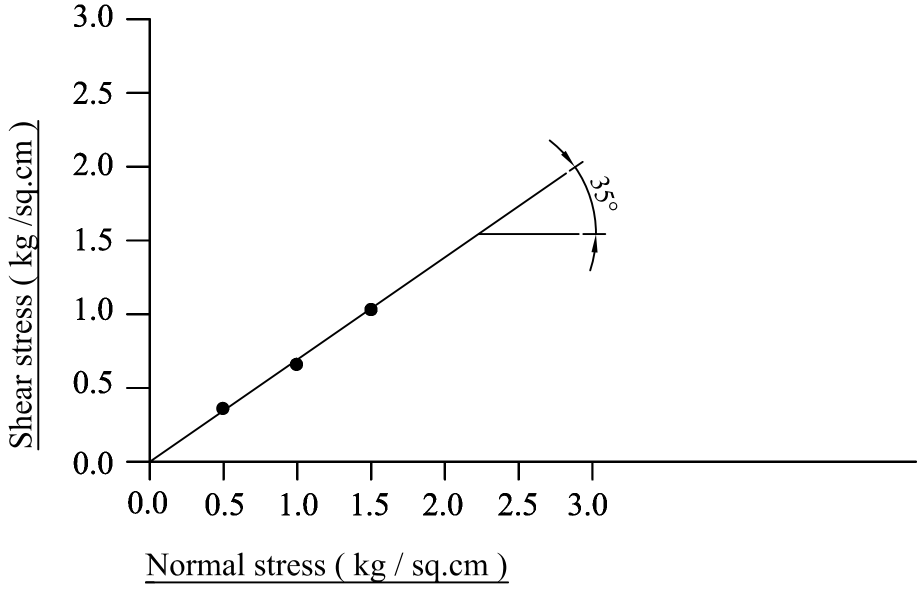
BH	GT 12	Depth(m.)	37.50	c(kg/cm^2) =	-	φ (degree) =	35

Direct Shear Plot



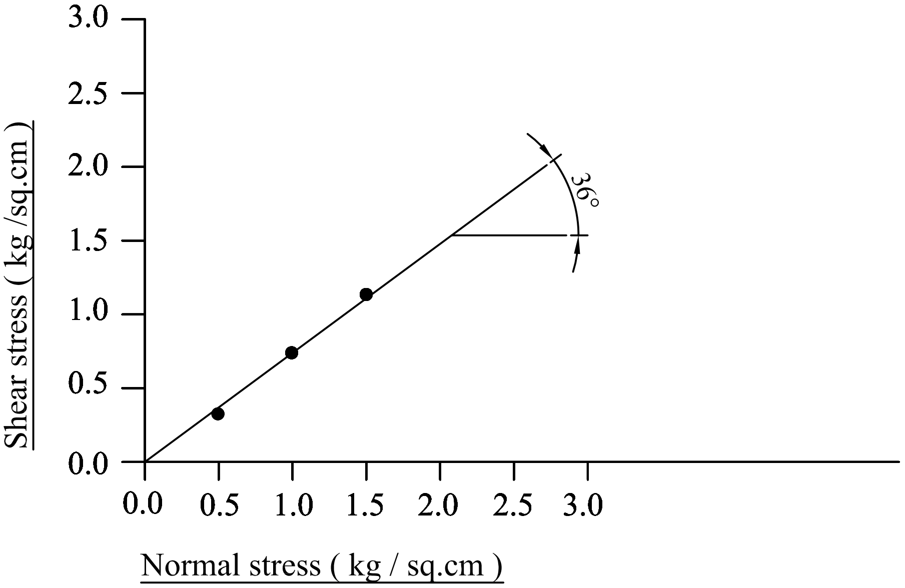
BH	GT 13	Depth(m.)	14.00	c(kg/cm^2) =	-	φ (degree) =	34

Direct Shear Plot



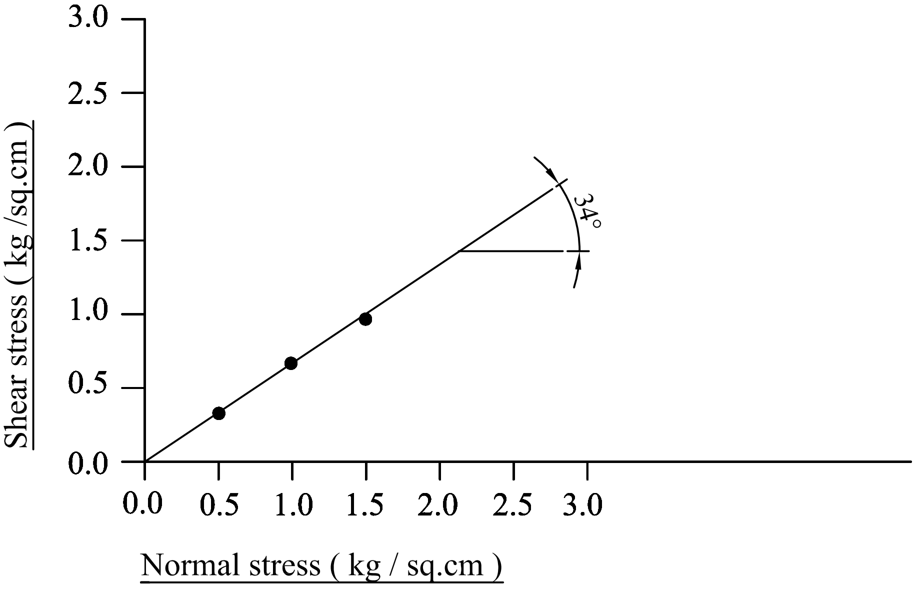
BH	GT 13	Depth(m.)	20.00	c(kg/cm^2) =	-	φ (degree) =	35

Direct Shear Plot



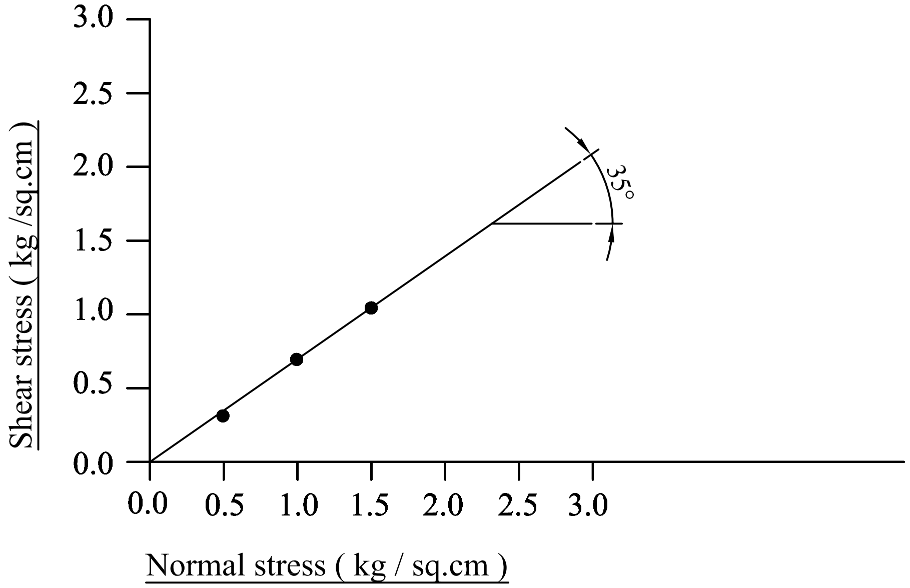
BH	GT 13	Depth(m.)	26.00	c(kg/cm^2) =	-	φ (degree) =	36

Direct Shear Plot



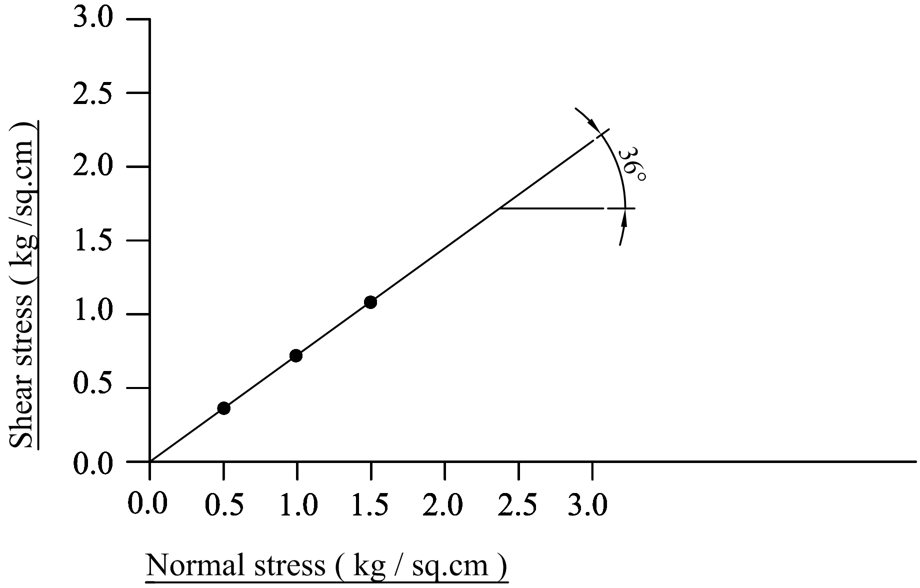
BH	GT 14	Depth(m.)	10.50	c(kg/cm^2) =	-	φ (degree) =	34

Direct Shear Plot



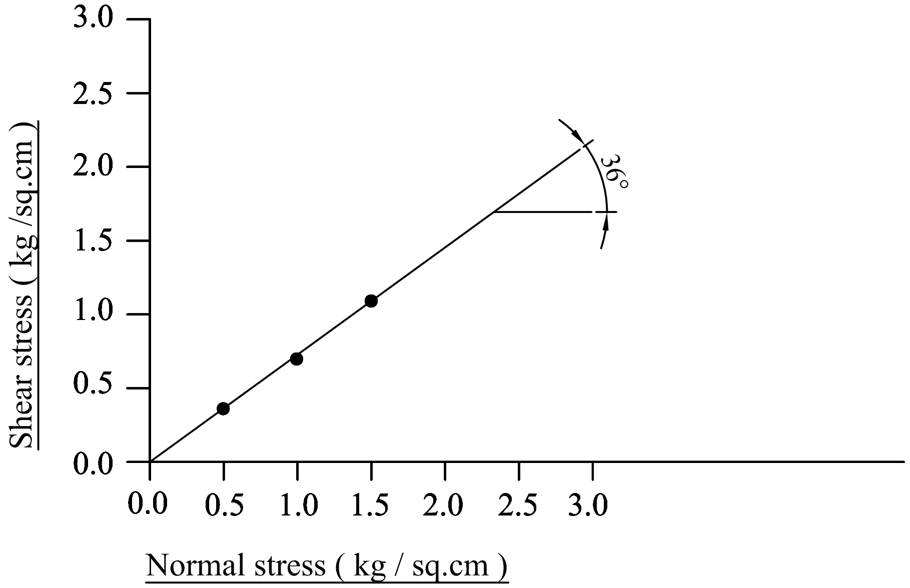
BH	GT 14	Depth(m.)	16.50	c(kg/cm^2) =	-	φ (degree) =	35

Direct Shear Plot



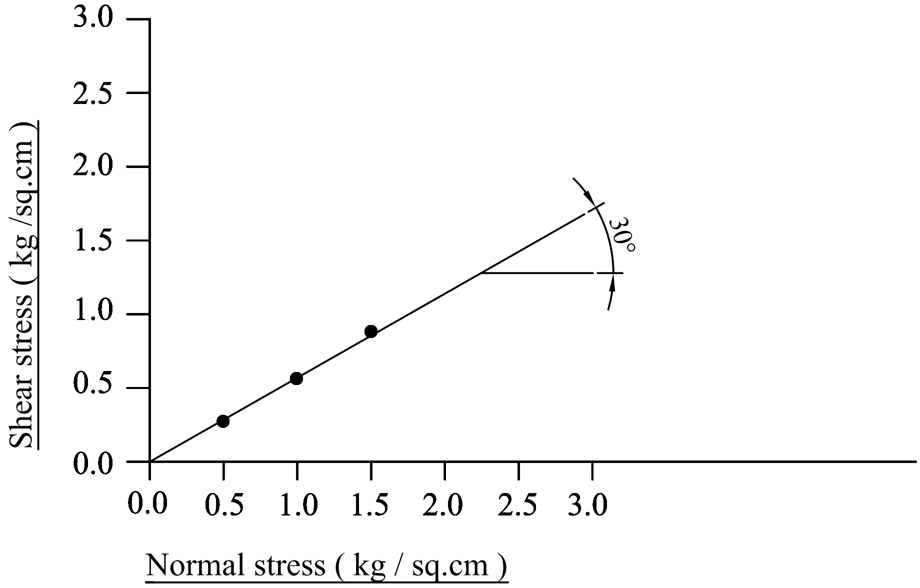
BH	GT 14	Depth(m.)	21.50	c(kg/cm^2) =	-	φ (degree) =	36

Direct Shear Plot



BH	GT 85	Depth(m.)	28.50	c(kg/cm²) =	-	φ (degree) =	36

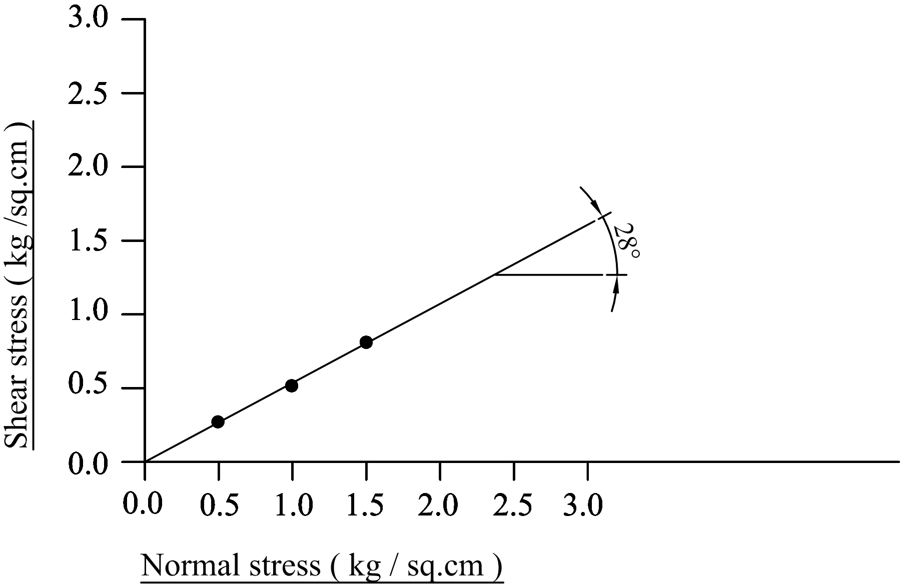
Direct Shear Plot



BH	GT 86	Depth(m.)	1.50	c(kg/cm²) =	-	φ (degree) =	30

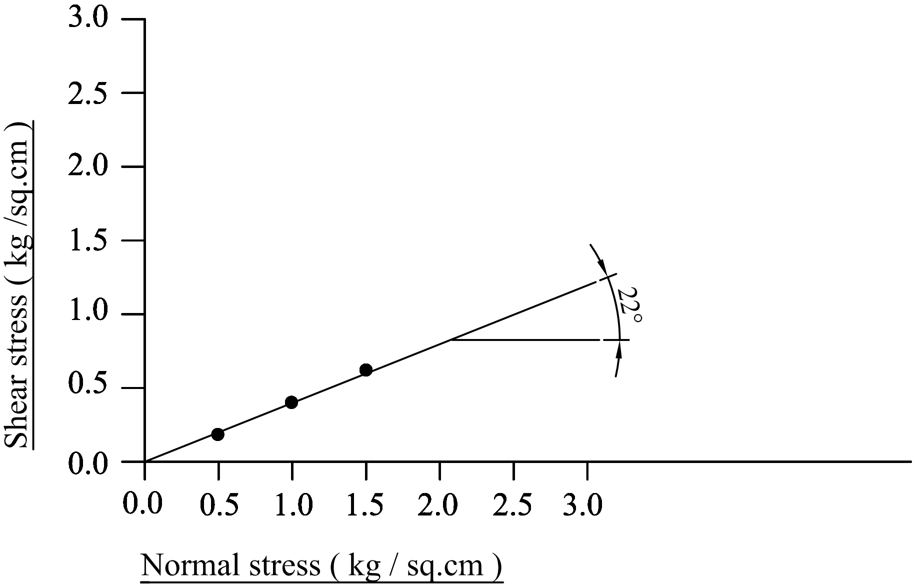
Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Direct Shear Plot



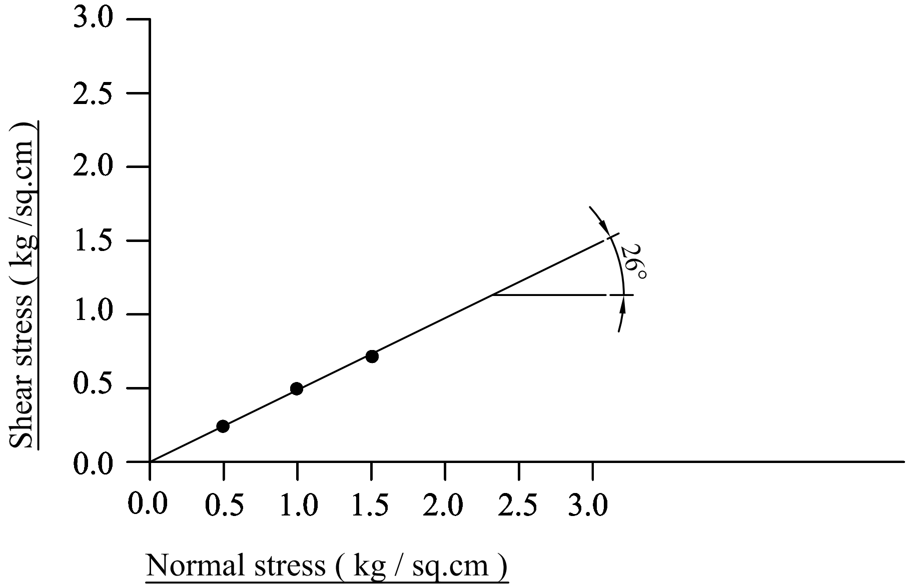
BH	GT 86	Depth(m.)	4.50	c(kg/cm^2) =	-	φ (degree) =	28

Direct Shear Plot



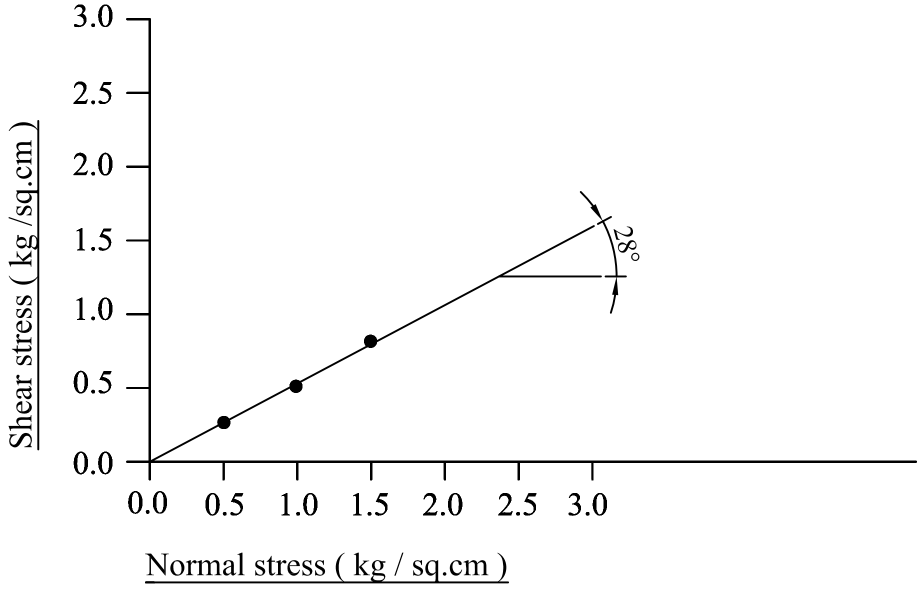
BH	GT 87	Depth(m.)	1.50	c(kg/cm^2) =	-	φ (degree) =	22

Direct Shear Plot



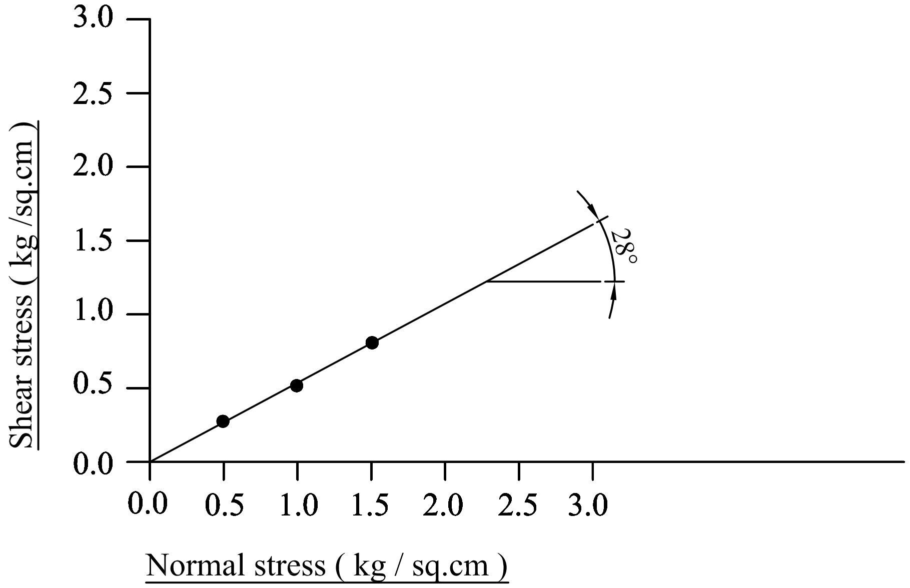
BH	GT 86A	Depth(m.)	1.50	c(kg/cm²) =	-	φ (degree) =	26

Direct Shear Plot



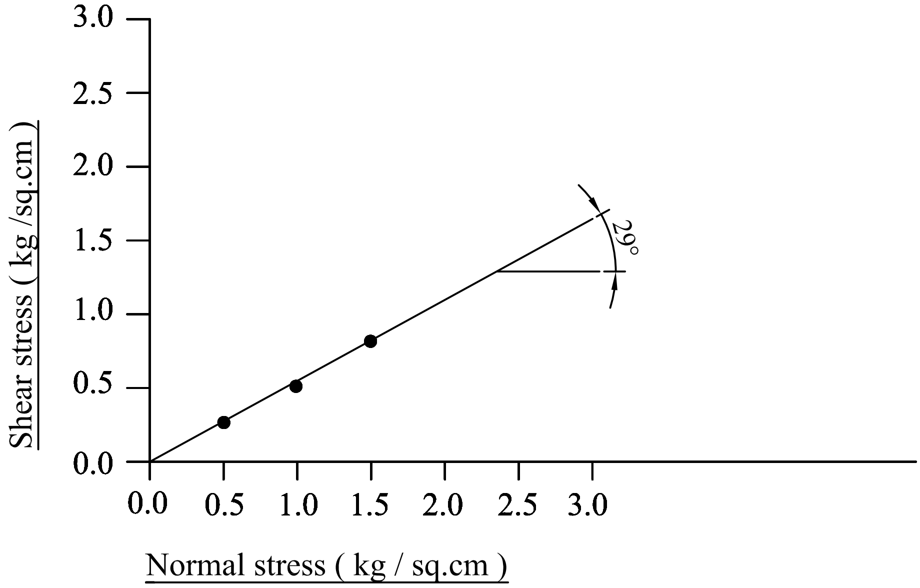
BH	GT 86A	Depth(m.)	4.50	c(kg/cm²) =	-	φ (degree) =	28

Direct Shear Plot



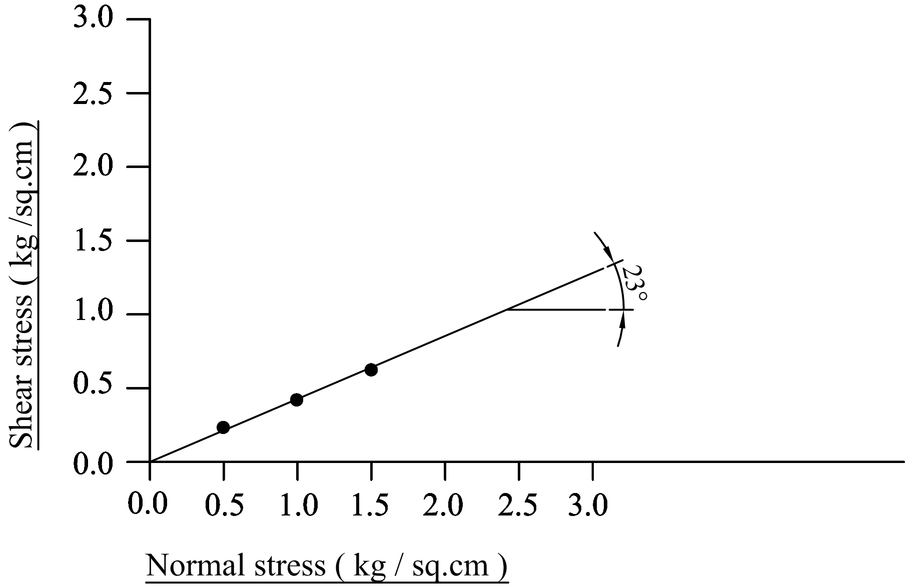
BH	GT 87A	Depth(m.)	3.00	c(kg/cm^2) =	-	φ (degree) =	28

Direct Shear Plot



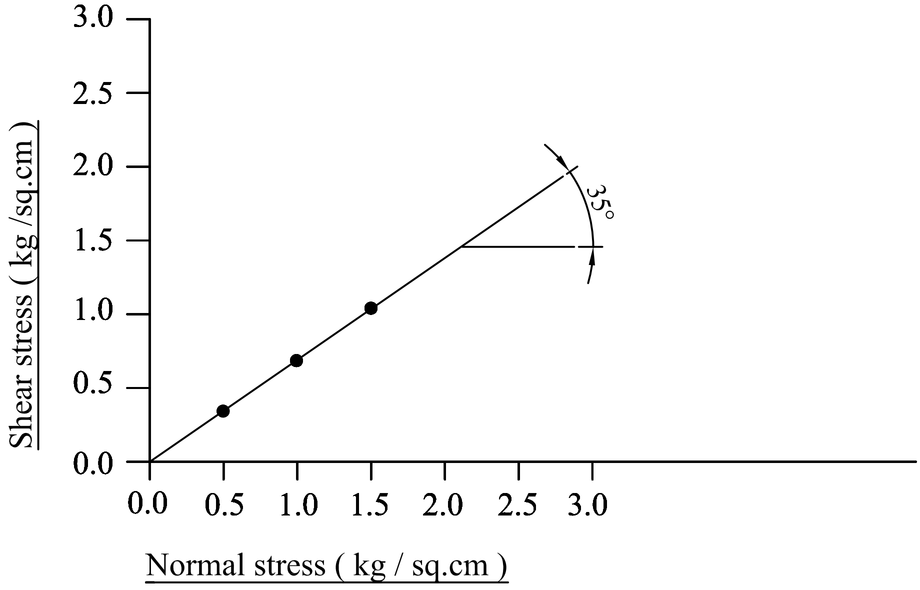
BH	GT 87A	Depth(m.)	6.00	c(kg/cm^2) =	-	φ (degree) =	29

Direct Shear Plot



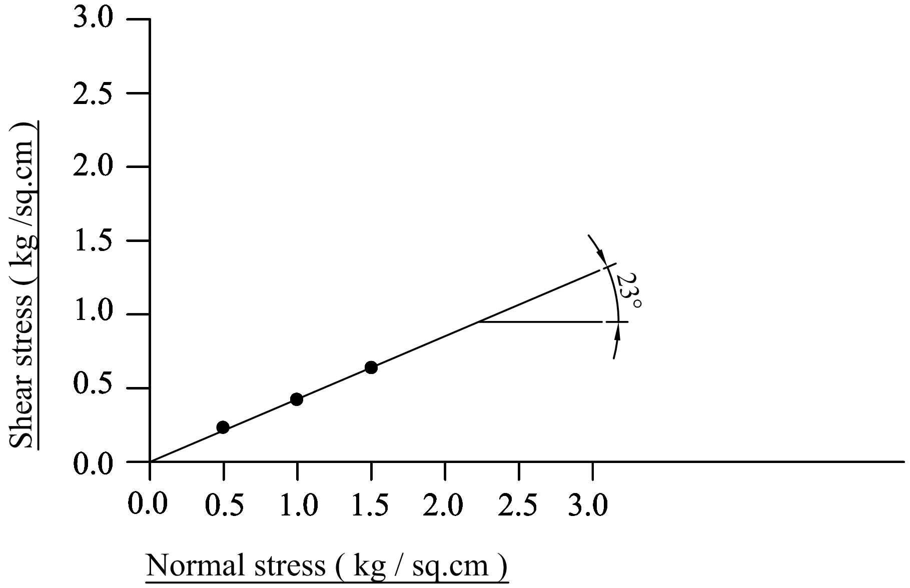
BH	GT 87	Depth(m.)	4.50	c(kg/cm^2) =	-	φ (degree) =	23

Direct Shear Plot



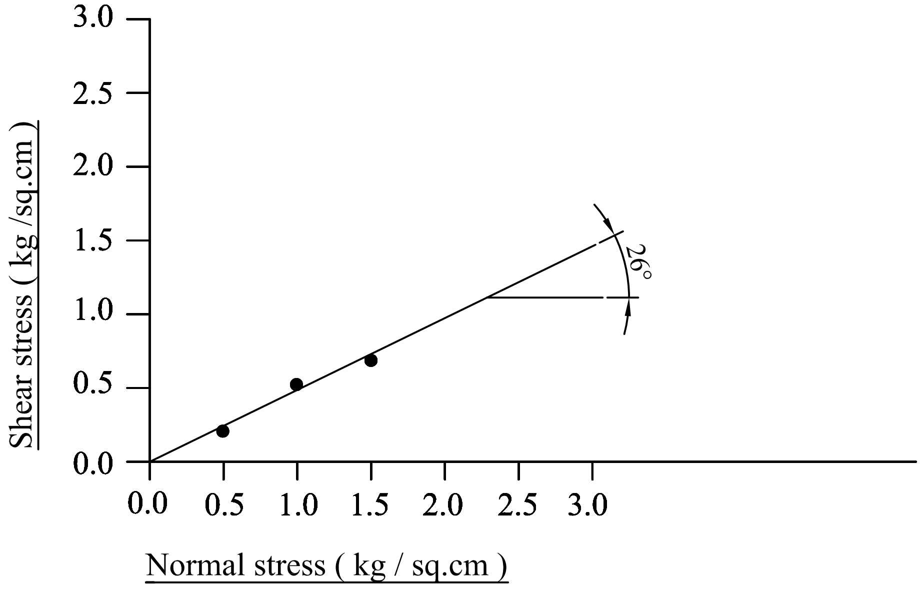
BH	GT 87	Depth(m.)	7.50	c(kg/cm^2) =	-	φ (degree) =	35

Direct Shear Plot



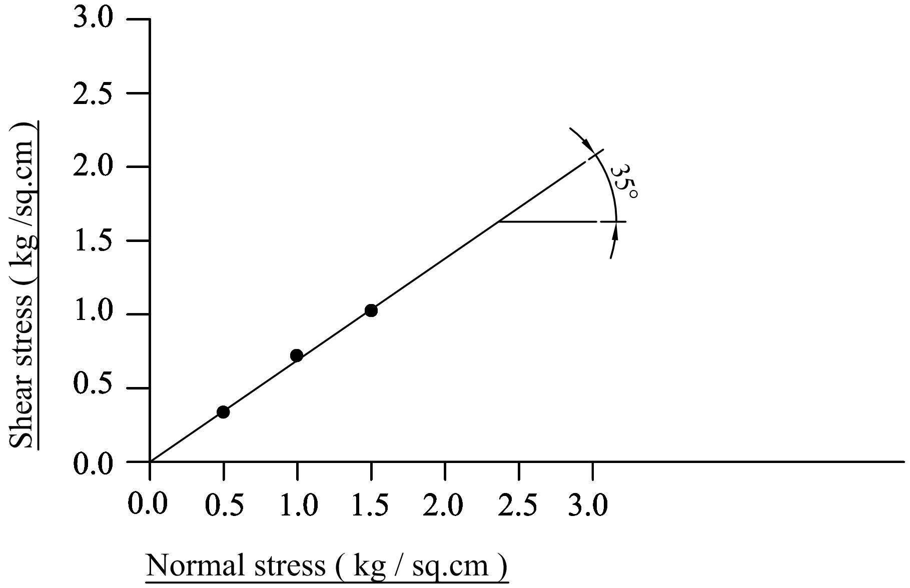
BH	GT 88	Depth(m.)	1.50	c(kg/cm^2) =	-	φ (degree) =	23

Direct Shear Plot



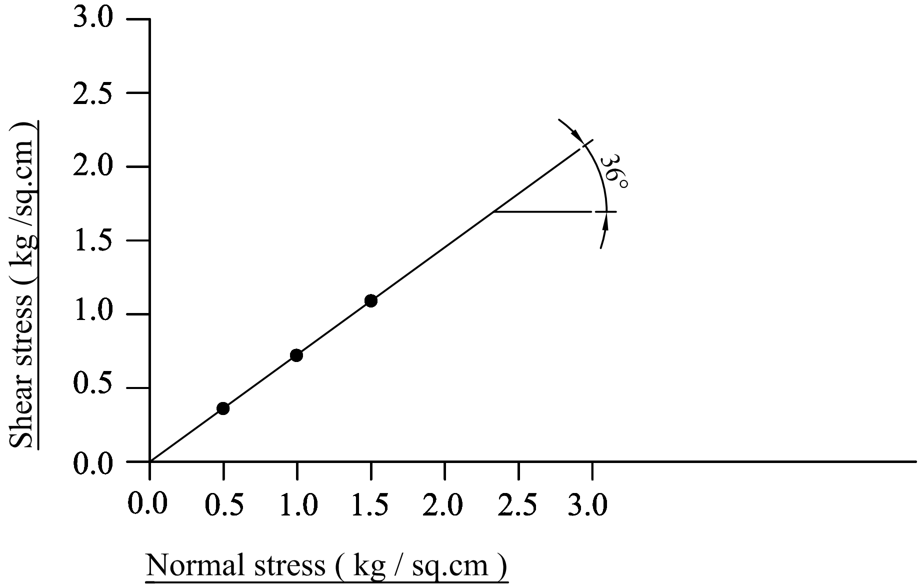
BH	GT 88	Depth(m.)	4.50	c(kg/cm^2) =	-	φ (degree) =	26

Direct Shear Plot



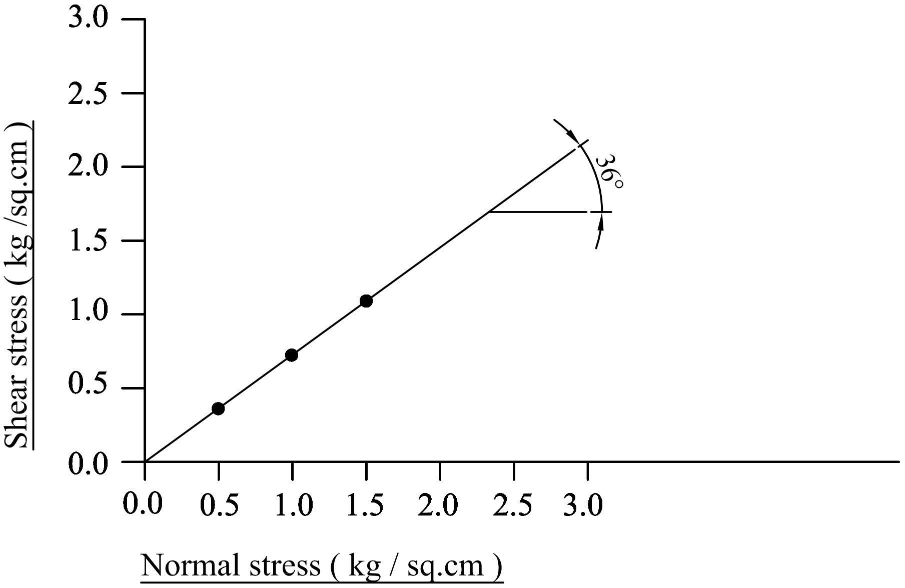
BH	GT 89	Depth(m.)	4.50	c(kg/cm^2) =	-	φ (degree) =	35

Direct Shear Plot



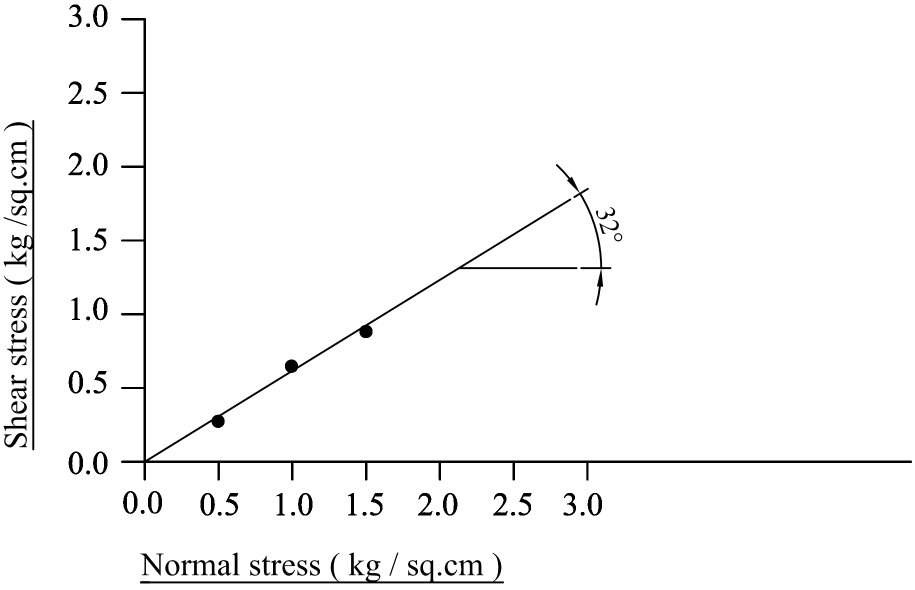
BH	GT 89	Depth(m.)	10.50	c(kg/cm^2) =	-	φ (degree) =	36

Direct Shear Plot



BH	GT 89	Depth(m.)	16.50	c(kg/cm²) =	-	φ (degree) =	36

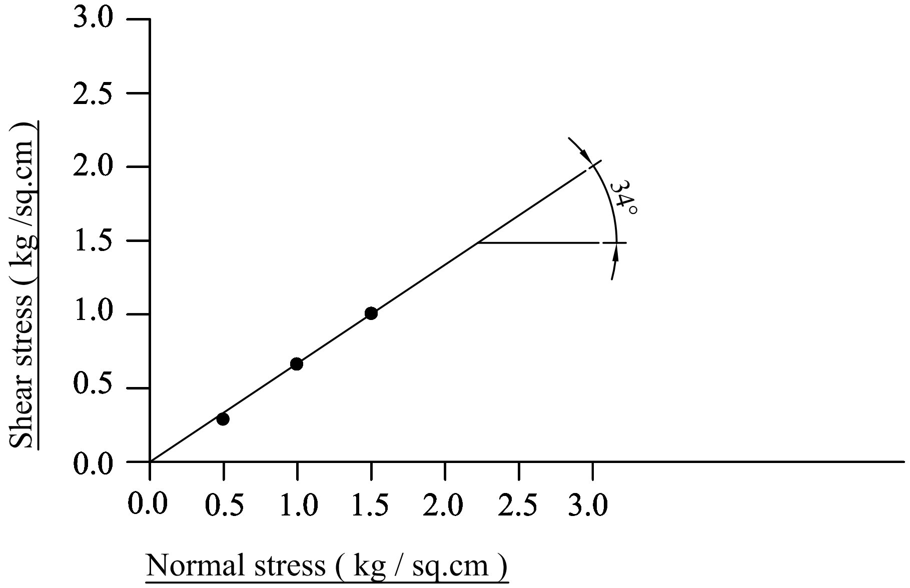
Direct Shear Plot



BH	GT 90	Depth(m.)	7.50	c(kg/cm²) =	-	φ (degree) =	32

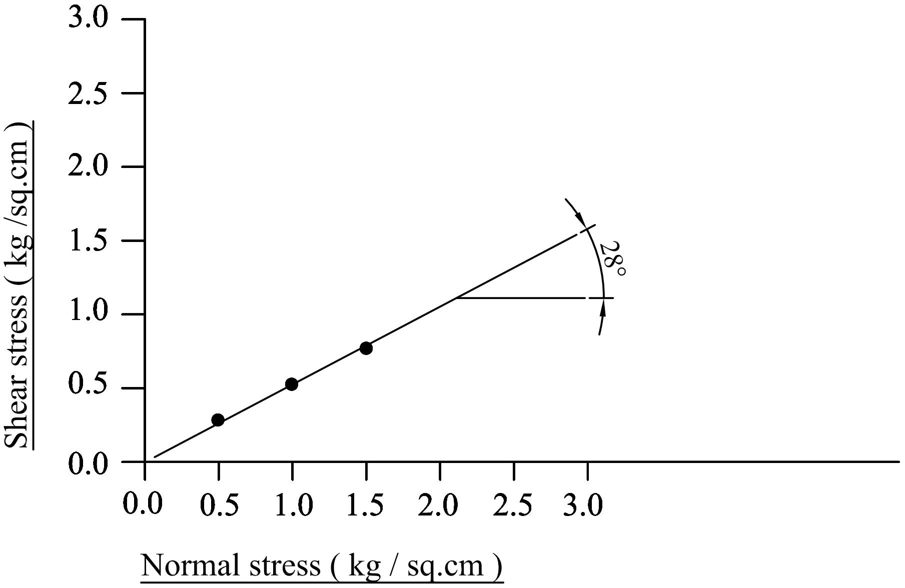
Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Direct Shear Plot



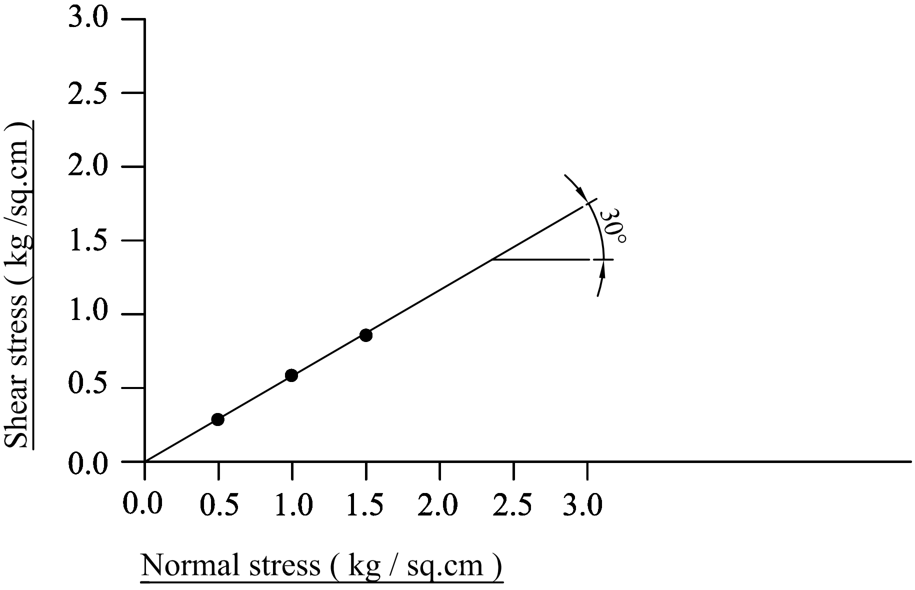
BH	GT 90	Depth(m.)	10.50	c(kg/cm^2) =	-	φ (degree) =	34

Direct Shear Plot



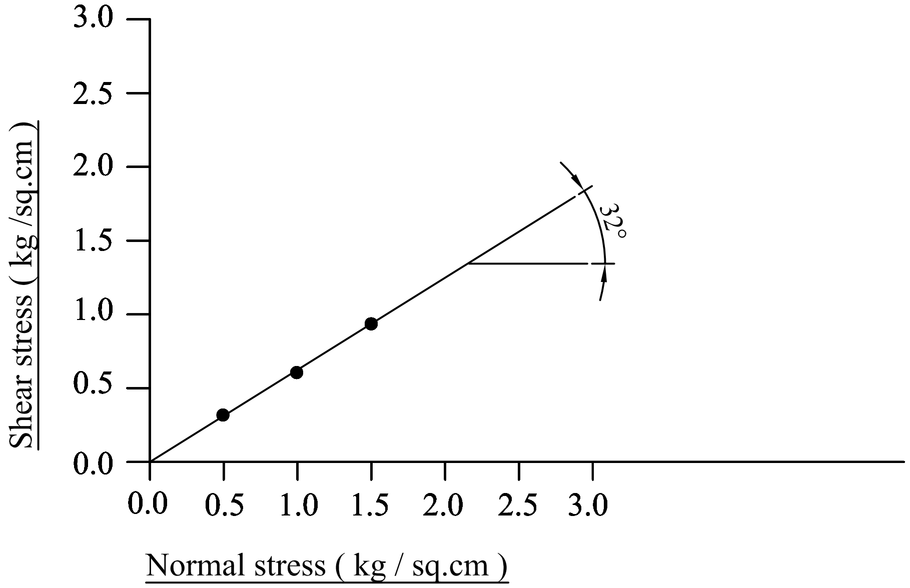
BH	GT 91	Depth(m.)	1.50	c(kg/cm^2) =	-	φ (degree) =	28

Direct Shear Plot



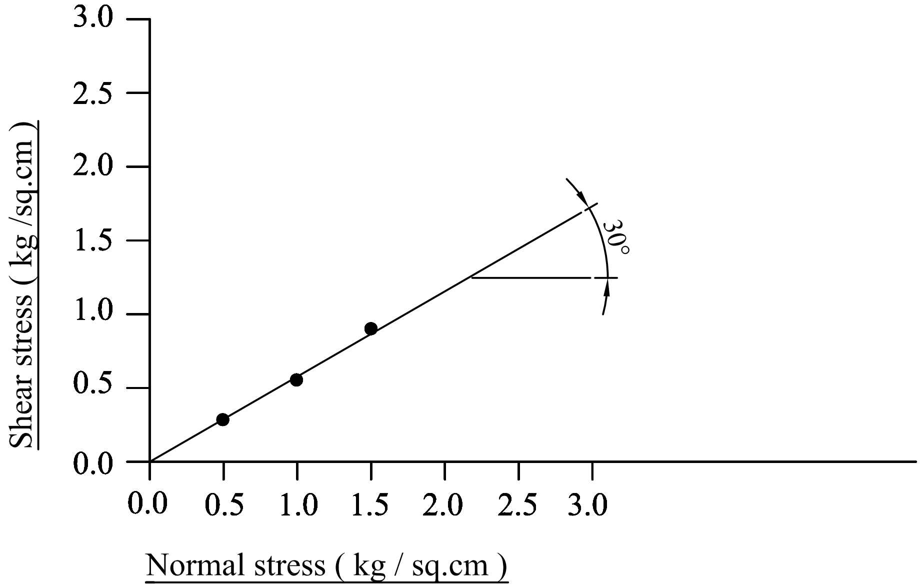
BH	GT 91	Depth(m.)	4.50	c(kg/cm^2) =	-	φ (degree) =	30

Direct Shear Plot



BH	GT 91	Depth(m.)	7.50	c(kg/cm^2) =	-	φ (degree) =	32

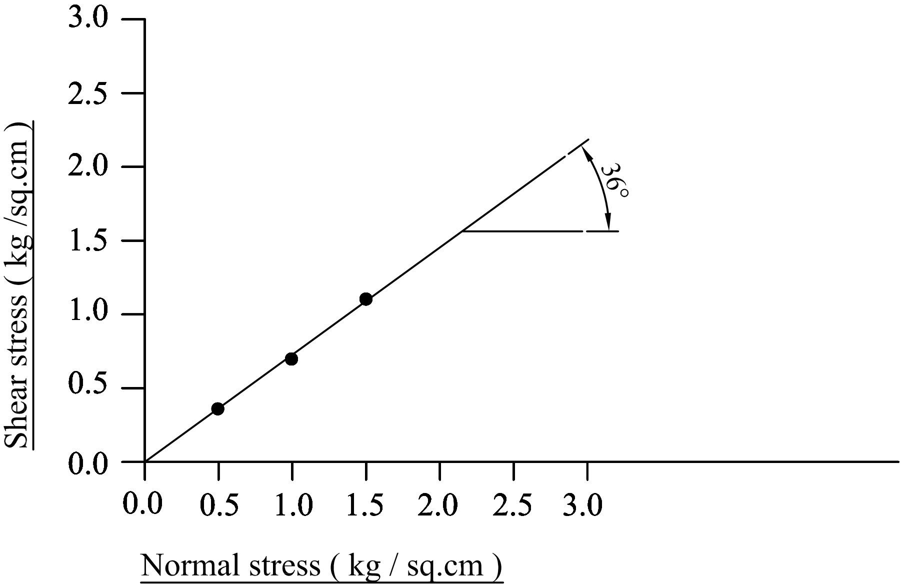
Direct Shear Plot



BH	GT 92	Depth(m.)	1.50	c(kg/cm^2) =	-	φ (degree) =	30

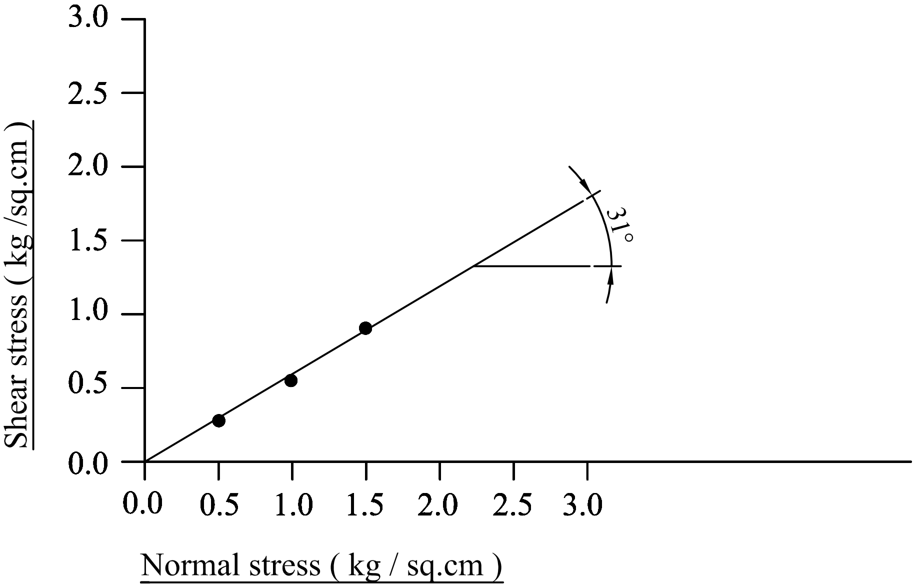
Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Direct Shear Plot



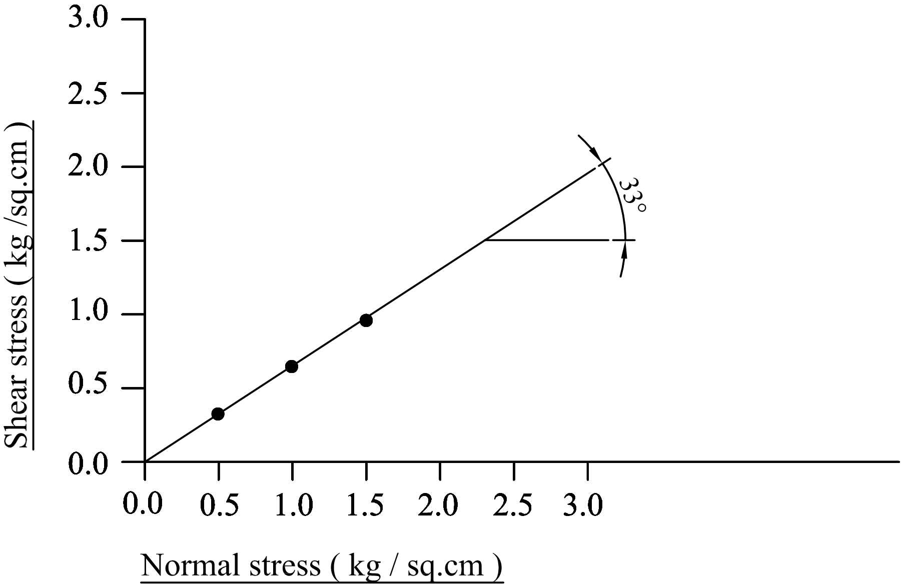
BH	GT 92	Depth(m.)	4.50	c(kg/cm²) =	-	φ (degree) =	31

Direct Shear Plot



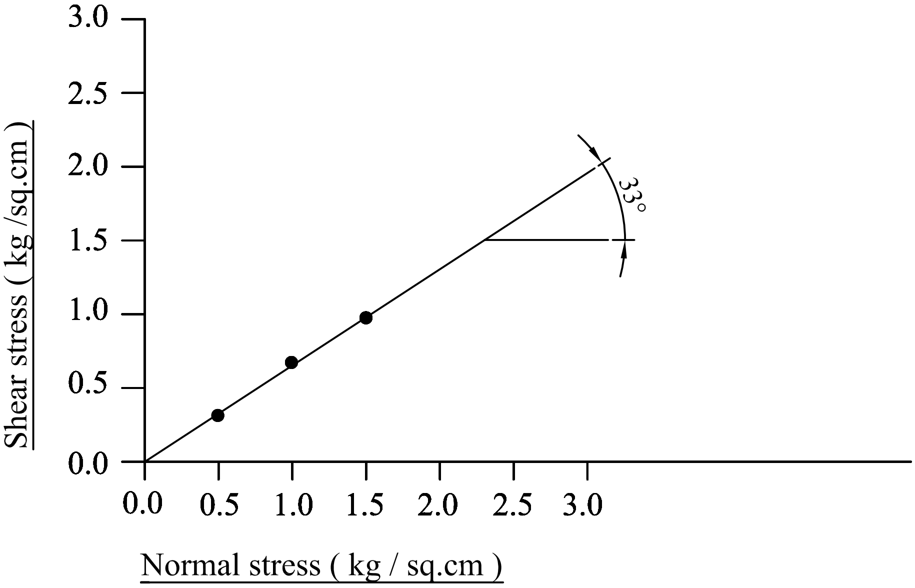
BH	GT 92	Depth(m.)	7.50	c(kg/cm²) =	-	φ (degree) =	31

Direct Shear Plot



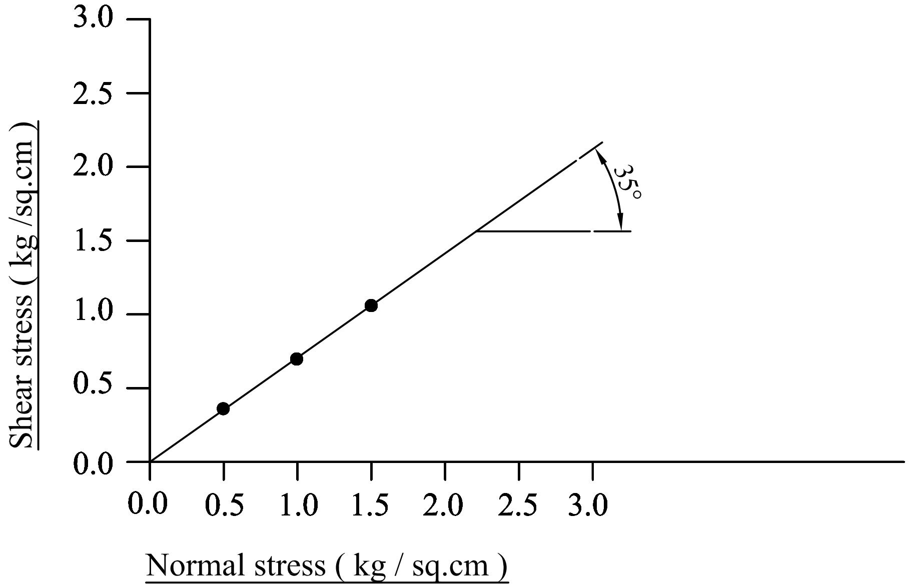
BH	GT 92	Depth(m.)	13.50	c(kg/cm^2) =	-	φ (degree) =	33

Direct Shear Plot



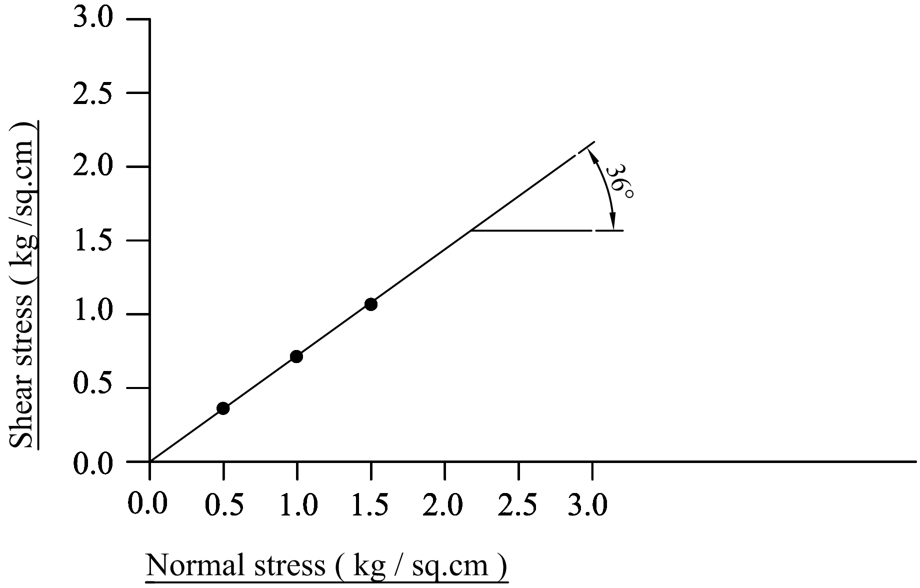
BH	GT 92	Depth(m.)	19.50	c(kg/cm^2) =	-	φ (degree) =	33

Direct Shear Plot



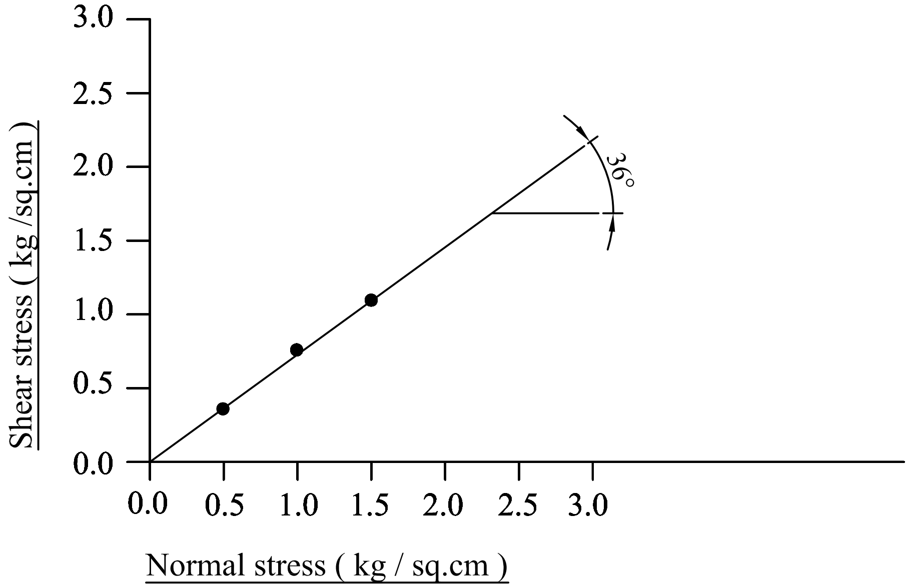
BH	GT 92	Depth(m.)	25.50	c(kg/cm^2) =	-	φ (degree) =	35

Direct Shear Plot



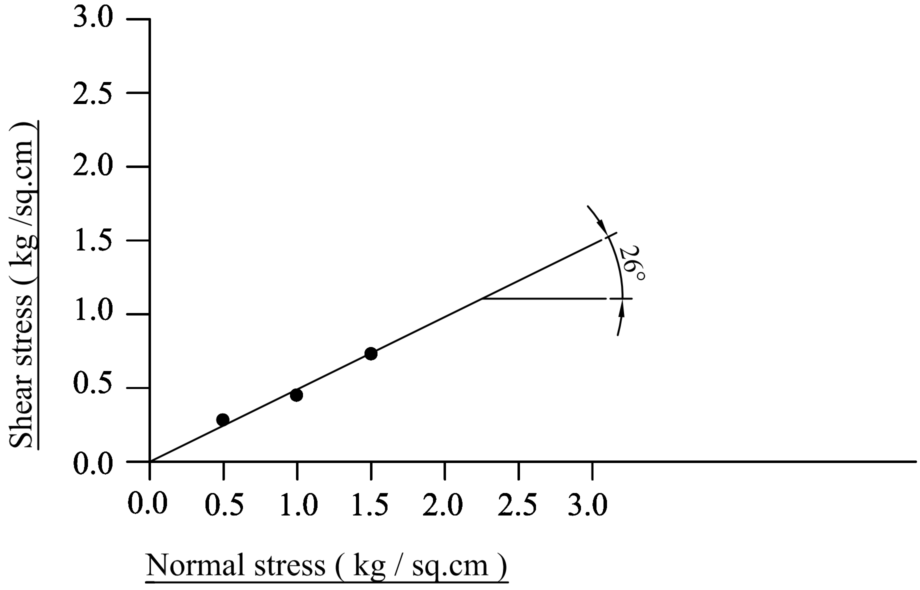
BH	GT 92	Depth(m.)	37.50	c(kg/cm^2) =	-	φ (degree) =	36

Direct Shear Plot



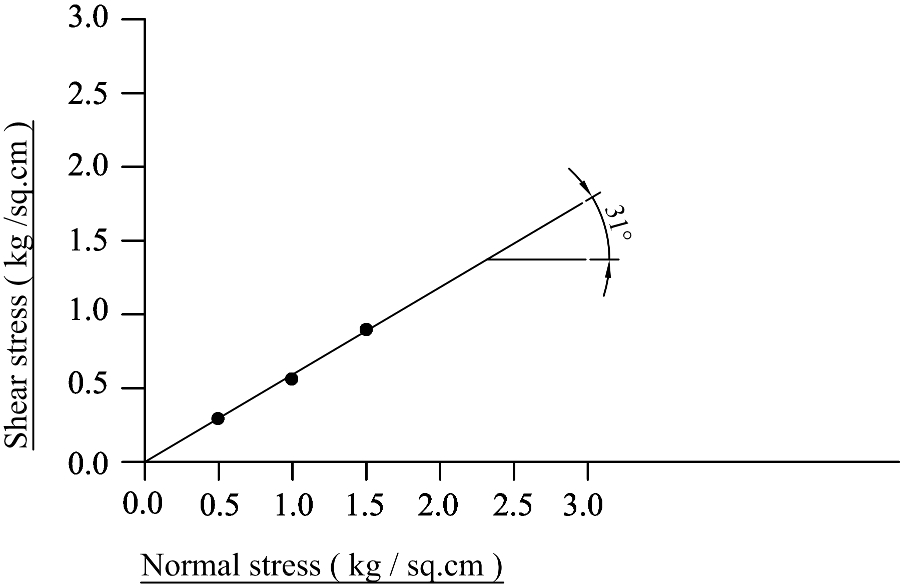
BH	GT 92	Depth(m.)	42.50	c(kg/cm²) =	-	φ (degree) =	36

Direct Shear Plot



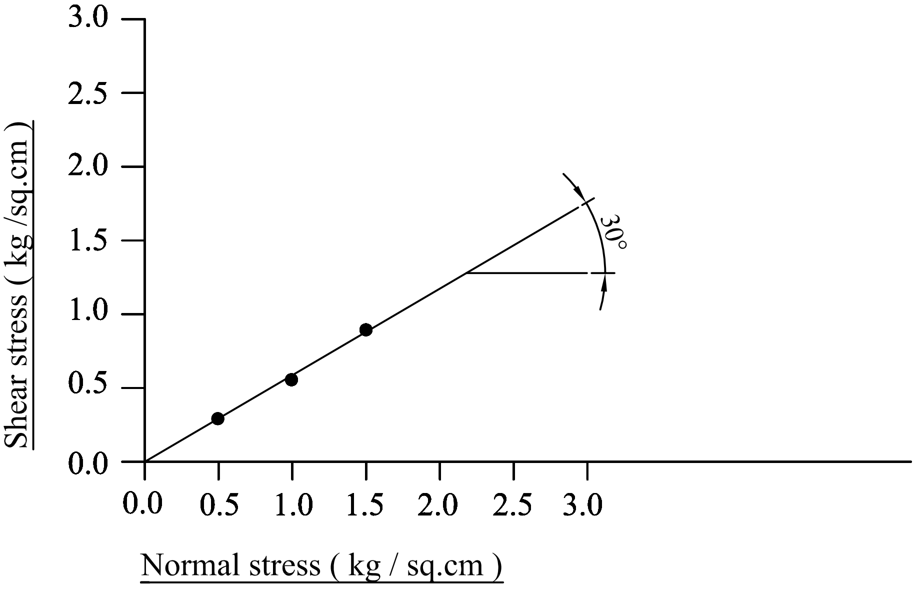
BH	GT 93	Depth(m.)	3.00	c(kg/cm²) =	-	φ (degree) =	26

Direct Shear Plot



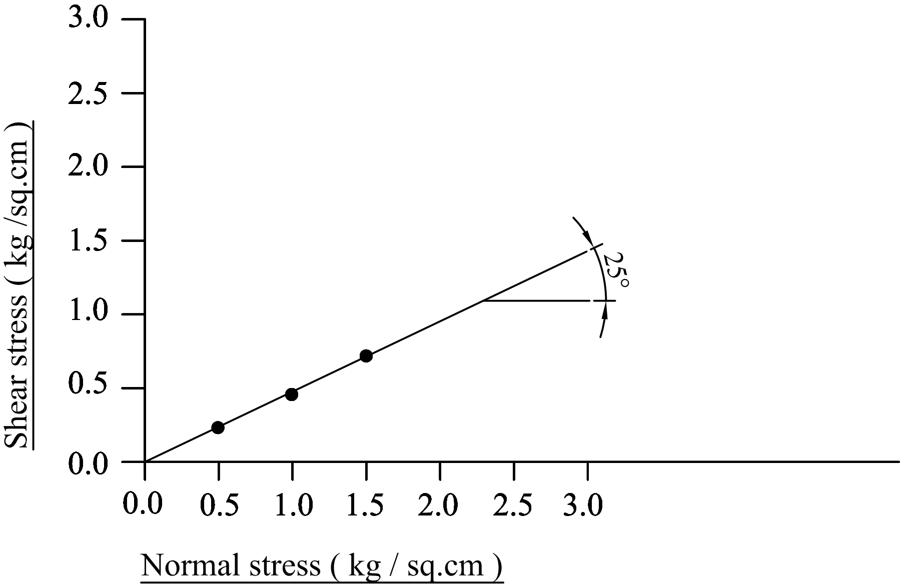
BH	GT 93	Depth(m.)	6.00	c(kg/cm^2) =	-	φ (degree) =	31

Direct Shear Plot



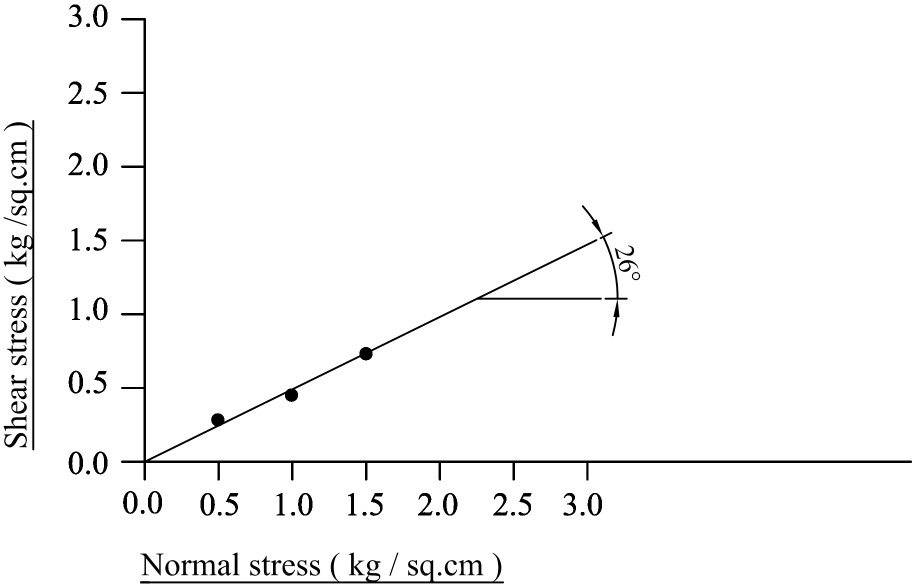
BH	GT 93	Depth(m.)	10.50	c(kg/cm^2) =	-	φ (degree) =	30

Direct Shear Plot



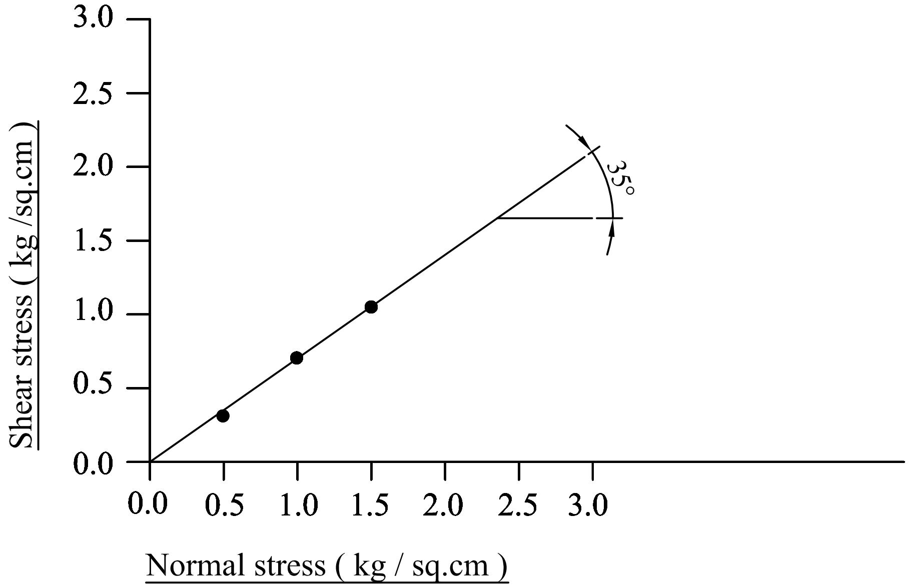
BH	GT 95	Depth(m.)	3.00	c(kg/cm^2) =	-	φ (degree) =	25

Direct Shear Plot



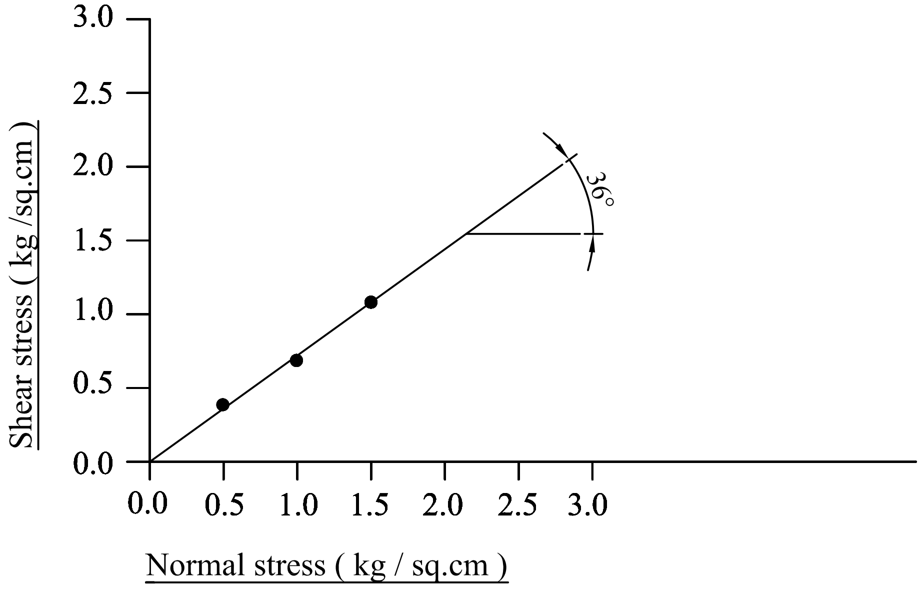
BH	GT 95	Depth(m.)	6.00	c(kg/cm^2) =	-	φ (degree) =	28

Direct Shear Plot



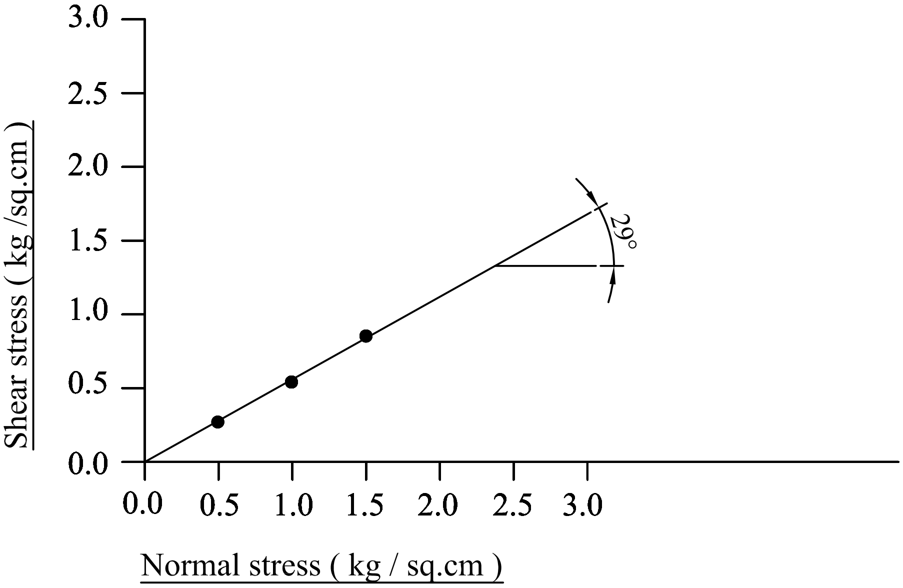
BH	GT 95	Depth(m.)	19.50	c(kg/cm^2) =	-	φ (degree) =	35

Direct Shear Plot



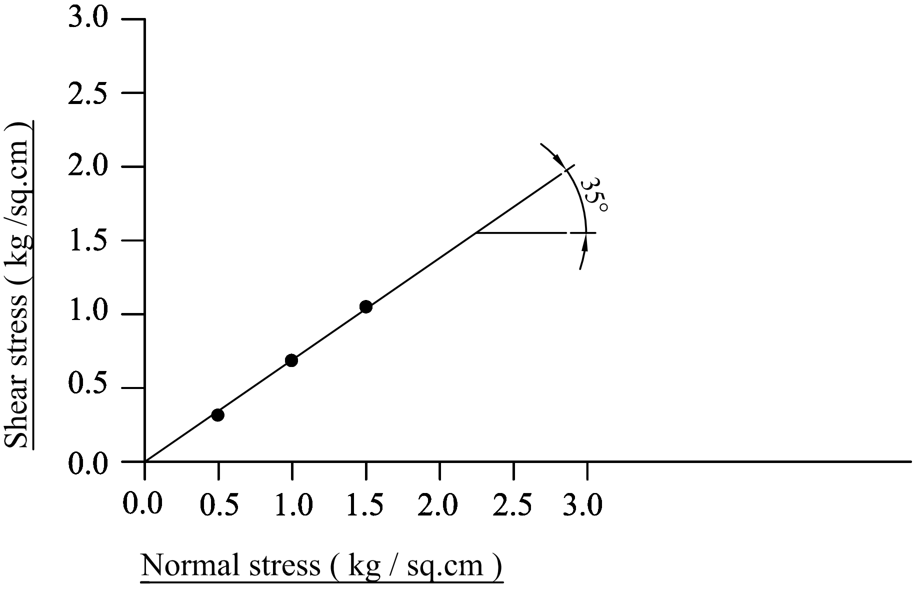
BH	GT 95	Depth(m.)	25.50	c(kg/cm^2) =	-	φ (degree) =	36

Direct Shear Plot



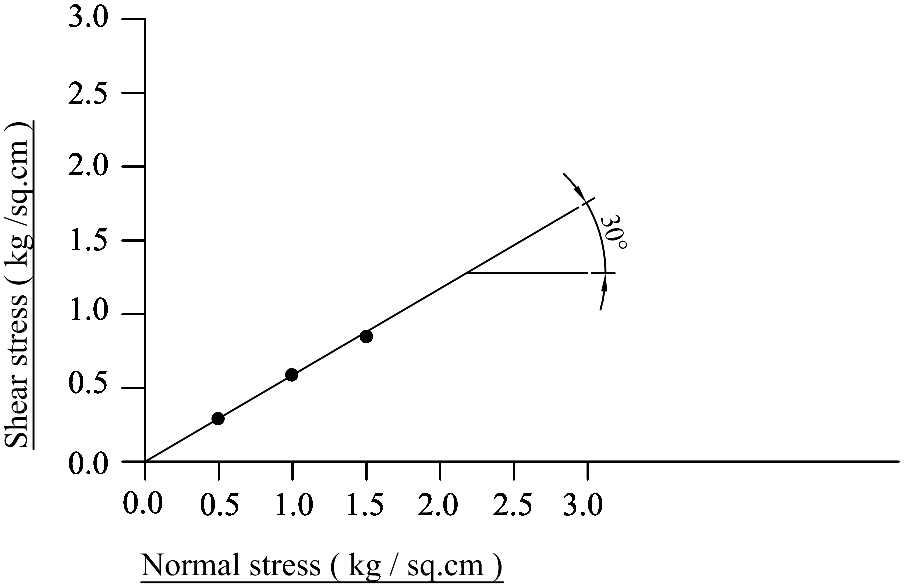
BH	GT 97	Depth(m.)	13.50	c(kg/cm^2) =	-	φ (degree) =	29

Direct Shear Plot



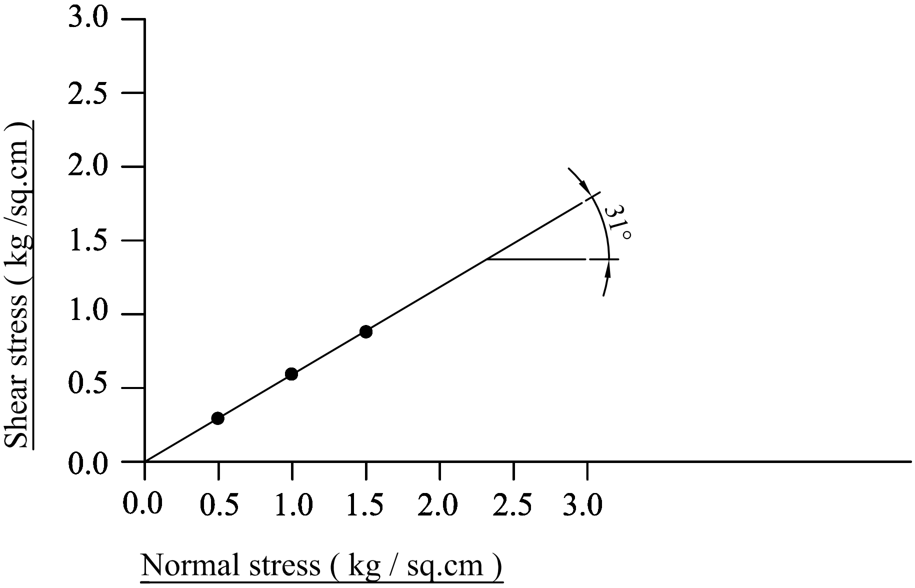
BH	GT 97	Depth(m.)	20.00	c(kg/cm^2) =	-	φ (degree) =	35

Direct Shear Plot



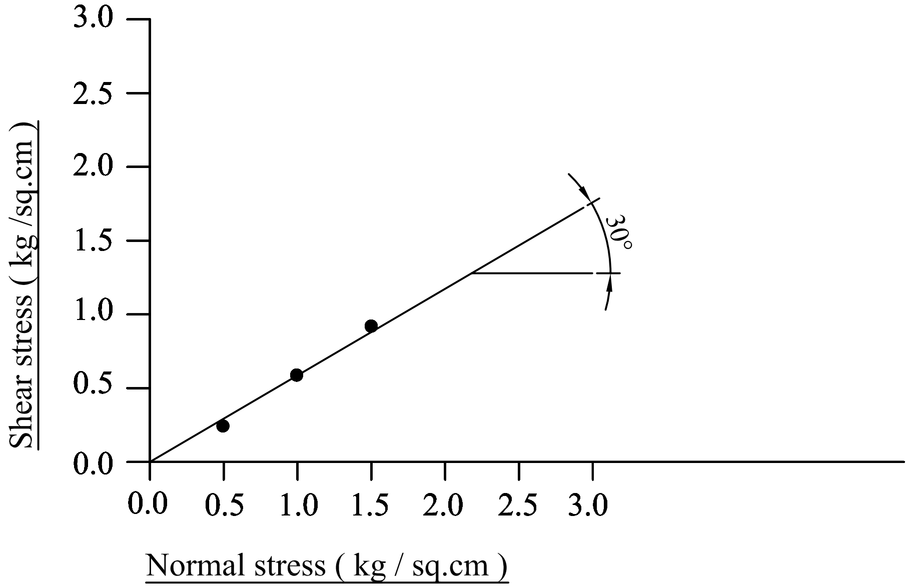
BH	GT 98	Depth(m.)	1.50	c(kg/cm^2) =	-	φ (degree) =	30

Direct Shear Plot



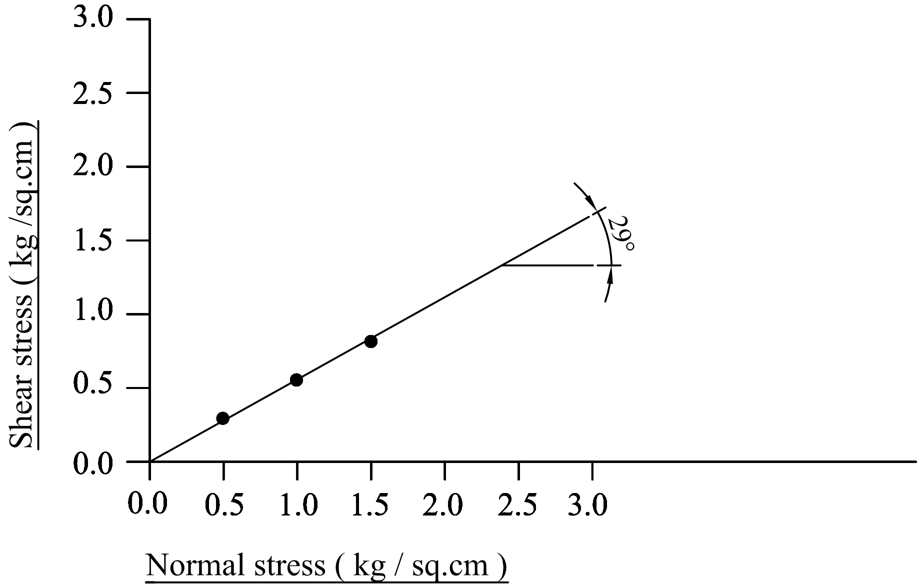
BH	GT 98	Depth(m.)	4.50	c(kg/cm^2) =	-	φ (degree) =	31

Direct Shear Plot



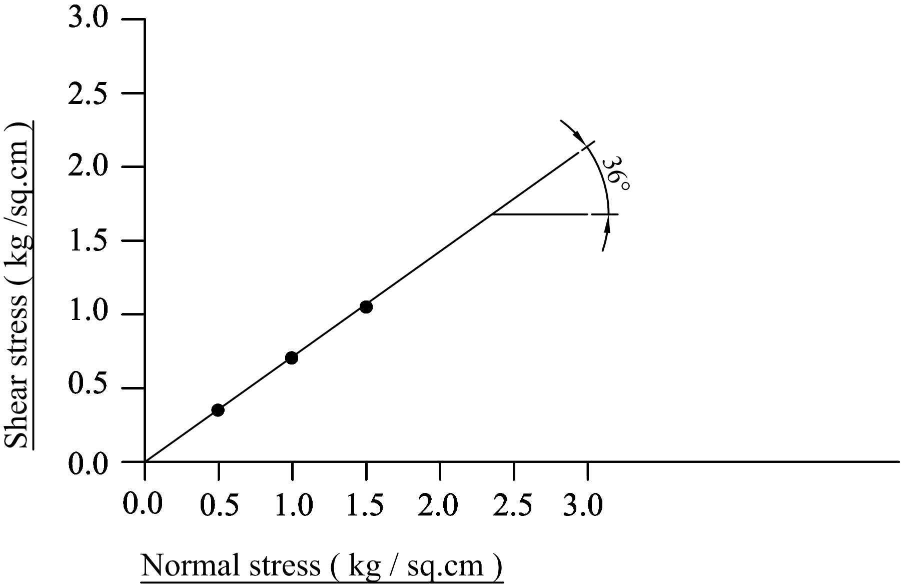
BH	GT 99	Depth(m.)	4.50	c(kg/cm^2) =	-	φ (degree) =	30

Direct Shear Plot



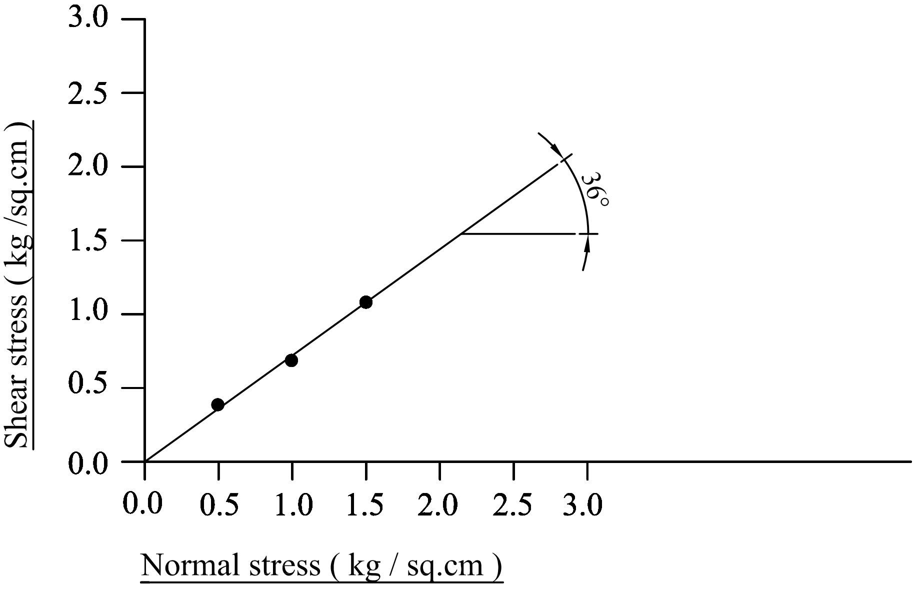
BH	GT 99	Depth(m.)	7.50	c(kg/cm^2) =	-	φ (degree) =	29

Direct Shear Plot



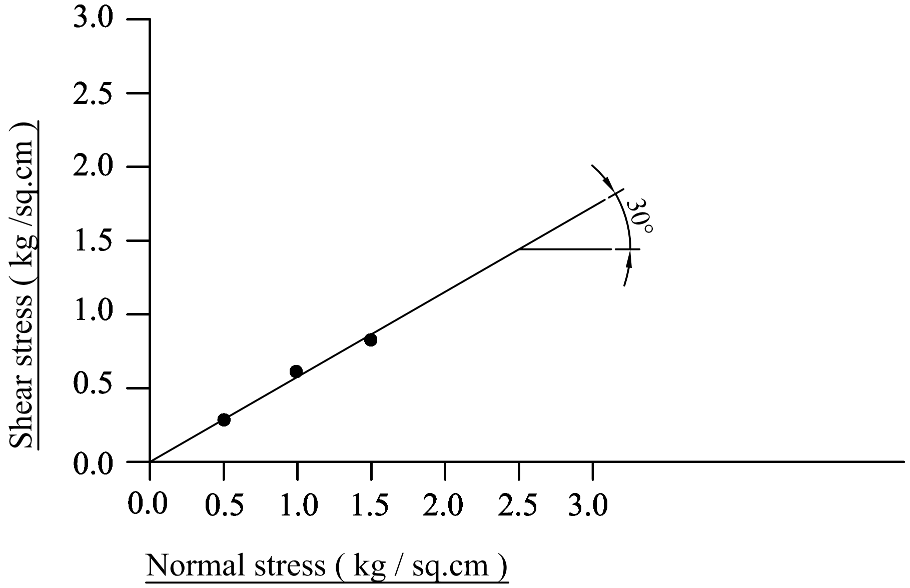
BH	GT 99	Depth(m.)	12.50	c(kg/cm²) =	-	φ (degree) =	36

Direct Shear Plot



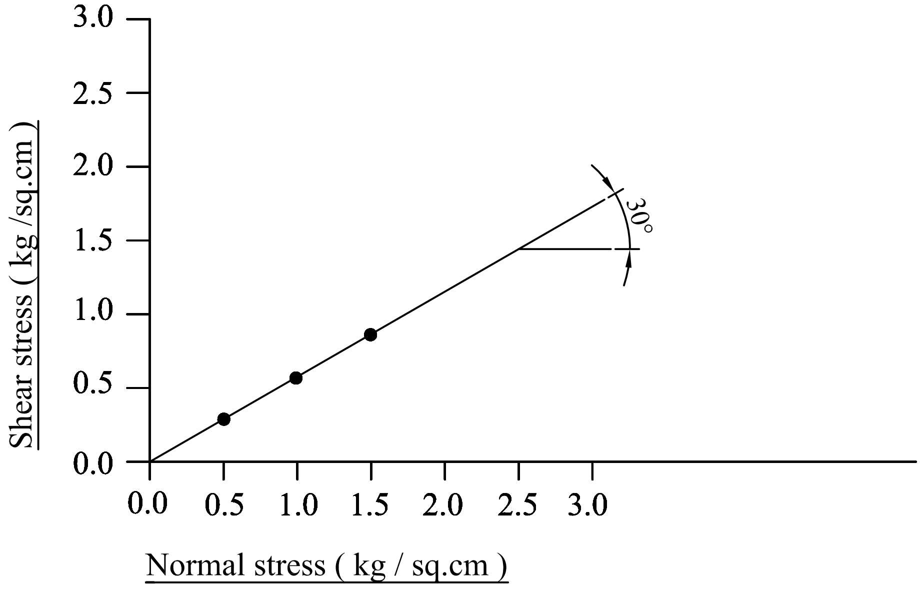
BH	GT 99	Depth(m.)	18.50	c(kg/cm²) =	-	φ (degree) =	36

Direct Shear Plot



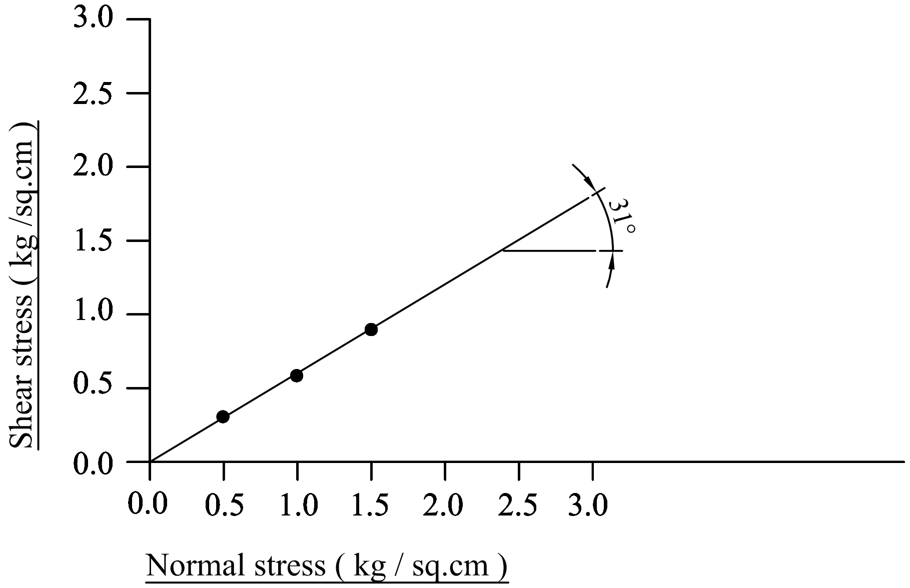
BH	GT 34	Depth(m.)	1.50	c(kg/cm^2) =	-	φ (degree) =	30

Direct Shear Plot



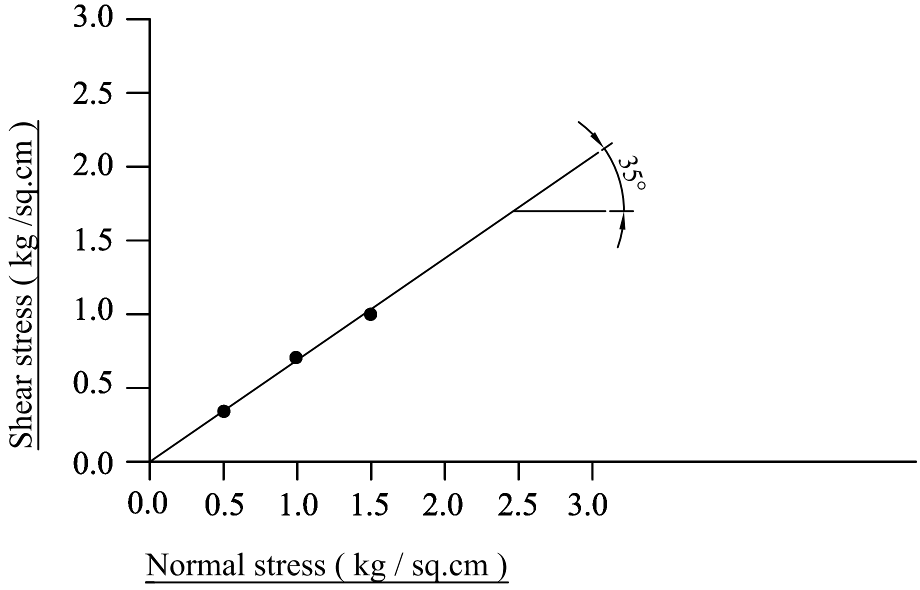
BH	GT 34	Depth(m.)	3.00	c(kg/cm^2) =	-	φ (degree) =	30

Direct Shear Plot



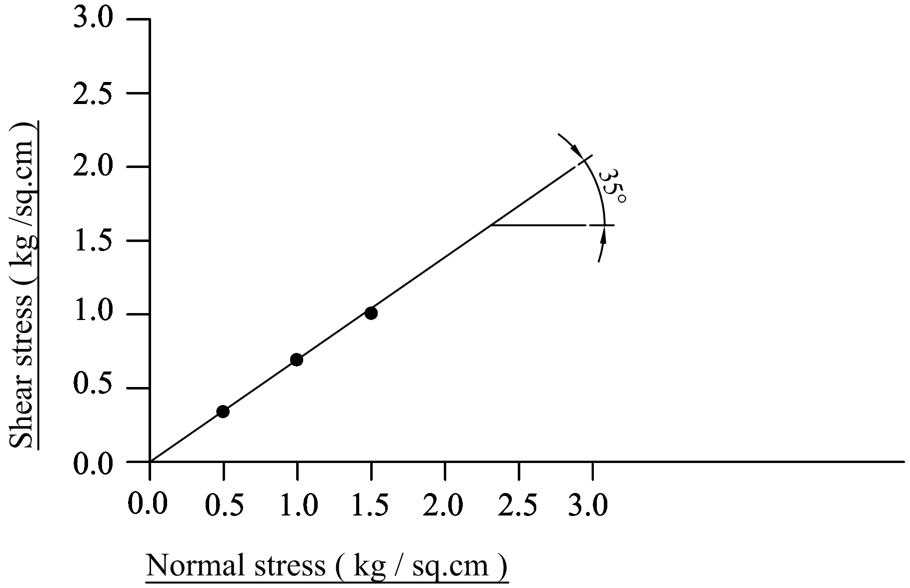
BH	GT 34	Depth(m.)	4.50	c(kg/cm^2) =	-	φ (degree) =	31

Direct Shear Plot



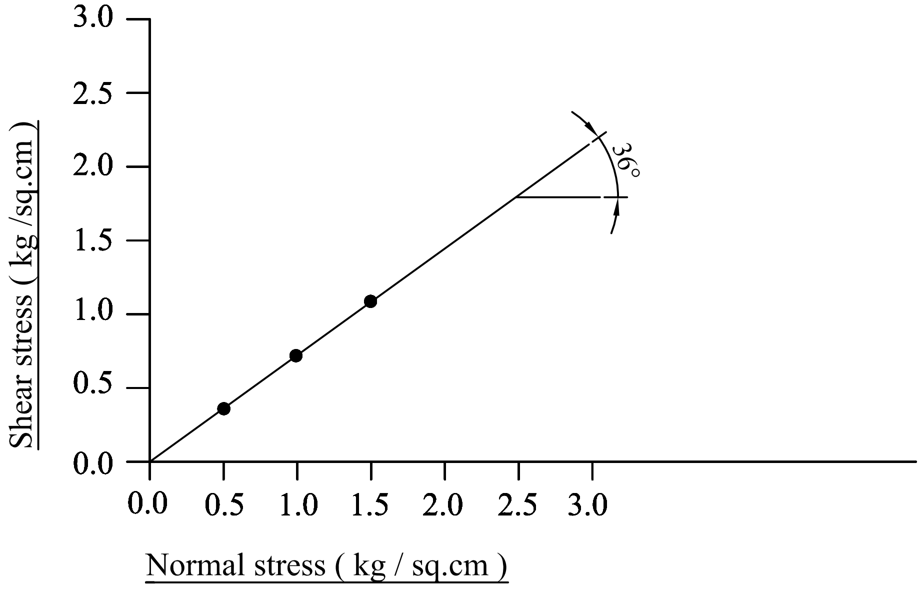
BH	GT 35	Depth(m.)	13.50	c(kg/cm^2) =	-	φ (degree) =	35

Direct Shear Plot



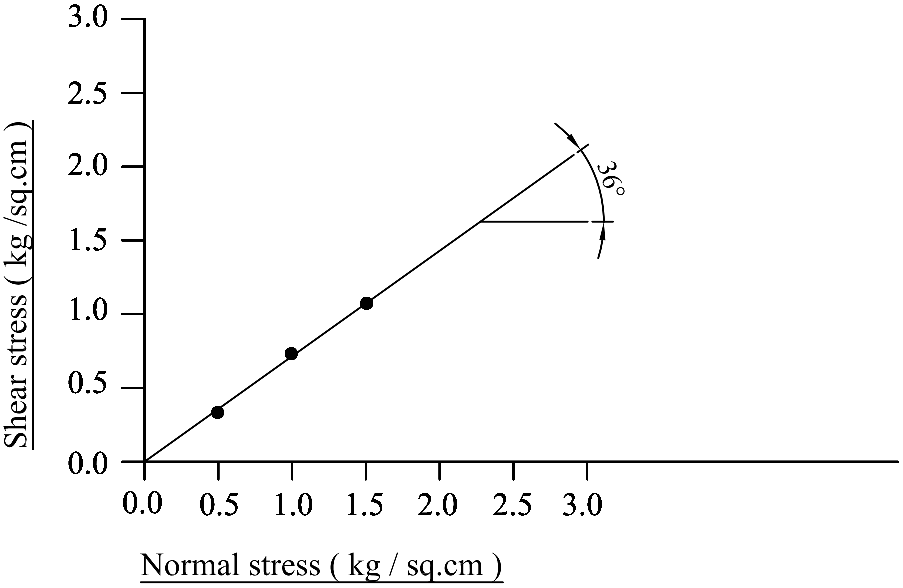
BH	GT 35	Depth(m.)	16.50	c(kg/cm^2) =	-	φ (degree) =	35

Direct Shear Plot



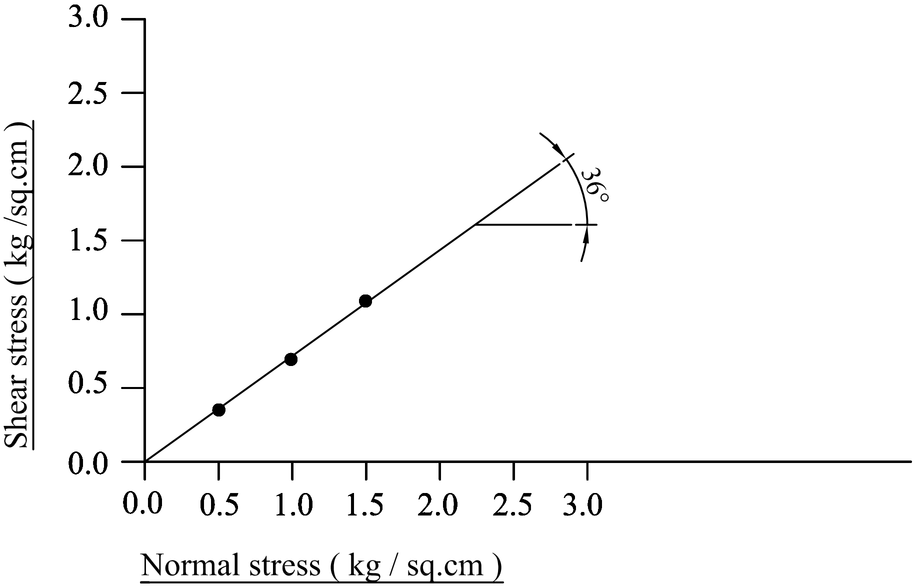
BH	GT 35	Depth(m.)	18.50	c(kg/cm^2) =	-	φ (degree) =	36

Direct Shear Plot



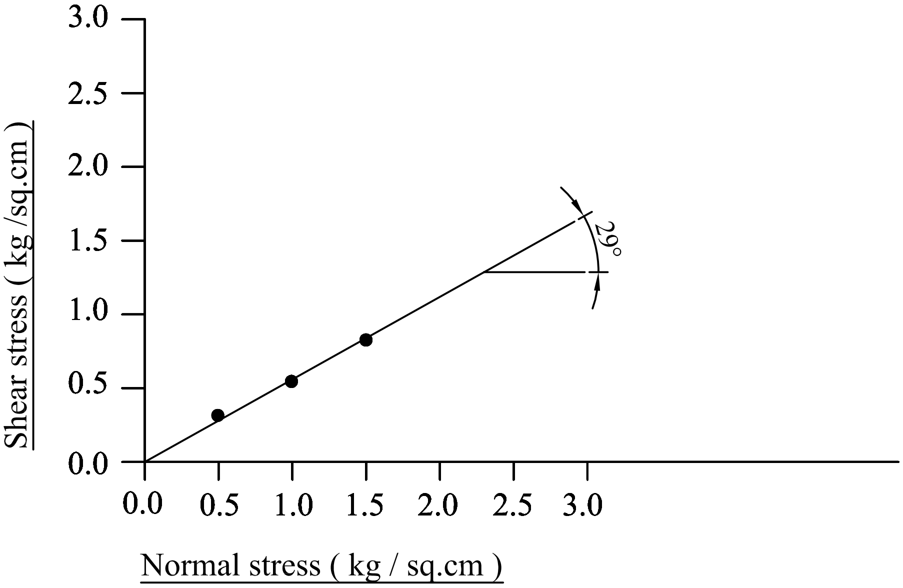
BH	GT 36B	Depth(m.)	4.50	c(kg/cm^2) =	-	φ (degree) =	36

Direct Shear Plot



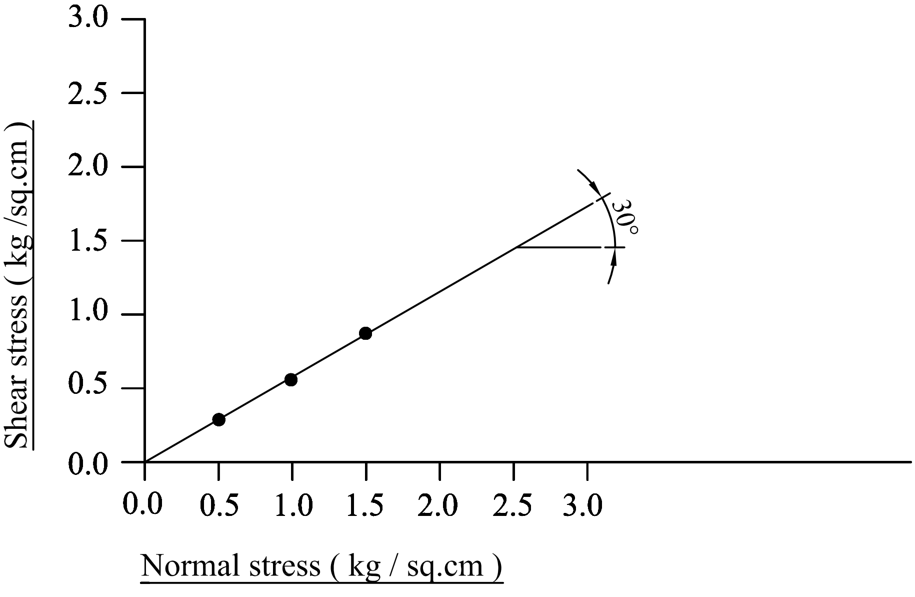
BH	GT 36B	Depth(m.)	6.00	c(kg/cm^2) =	-	φ (degree) =	36

Direct Shear Plot



BH	GT 37	Depth(m.)	1.50	c(kg/cm^2) =	-	φ (degree) =	29

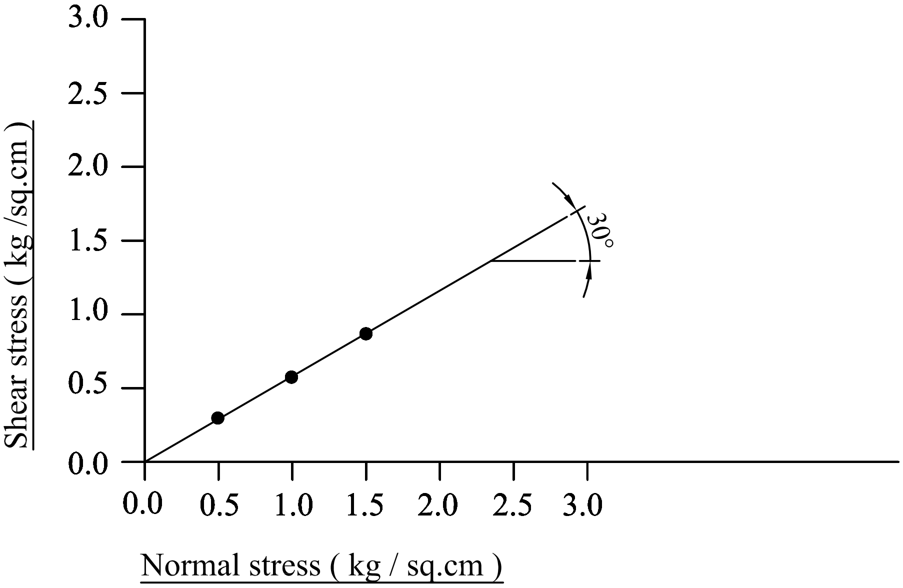
Direct Shear Plot



BH	GT 37	Depth(m.)	3.00	c(kg/cm^2) =	-	φ (degree) =	30

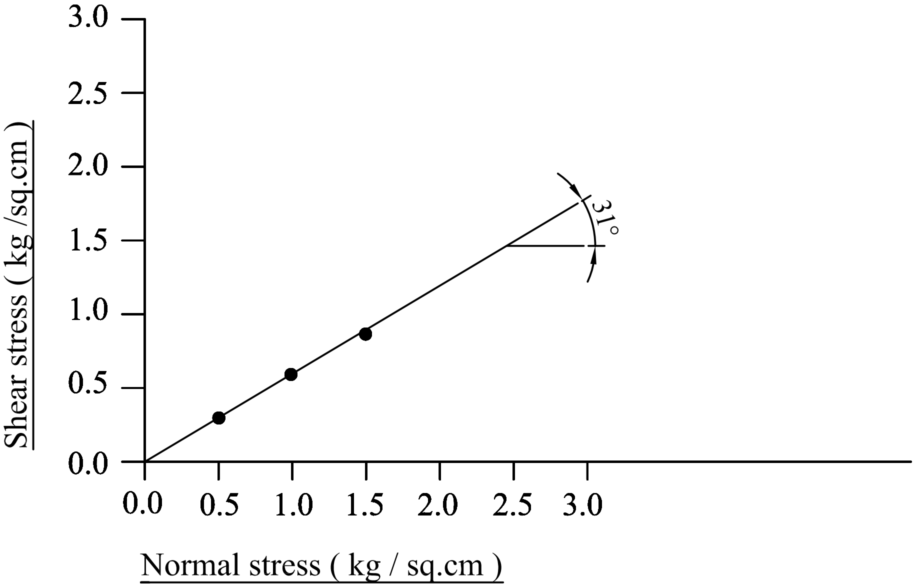
Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Direct Shear Plot



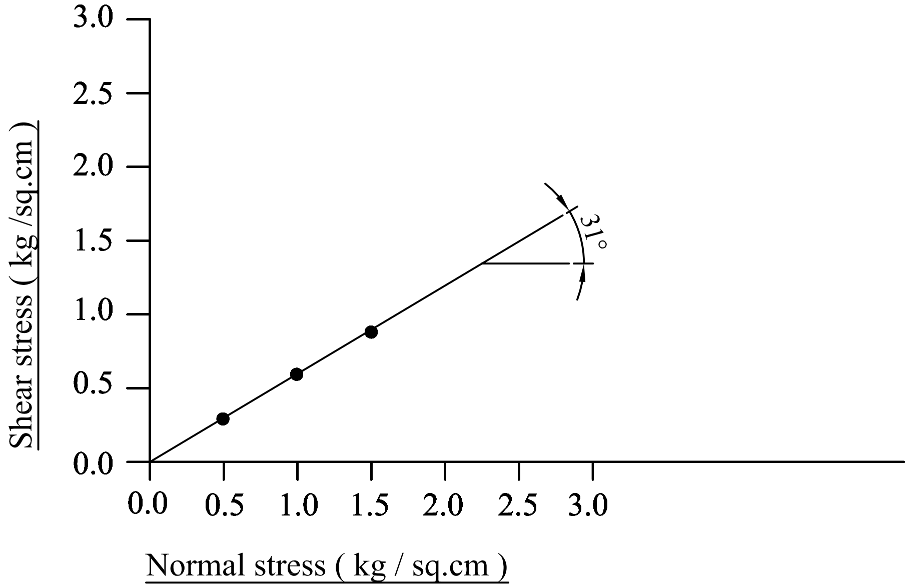
BH	GT 38	Depth(m.)	4.50	c(kg/cm²) =	-	φ (degree) =	30

Direct Shear Plot



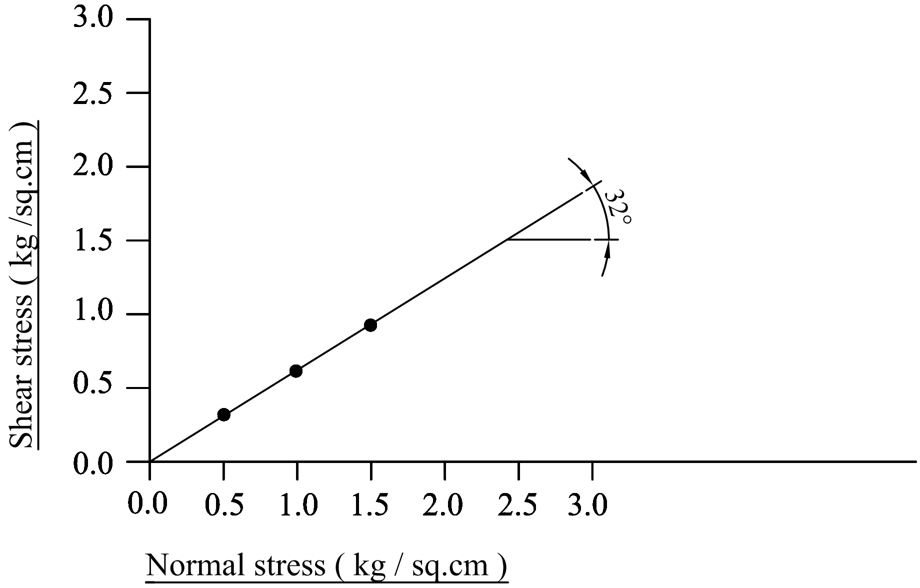
BH	GT 38	Depth(m.)	6.00	c(kg/cm²) =	-	φ (degree) =	31

Direct Shear Plot



BH	GT 38	Depth(m.)	7.50	c(kg/cm^2) =	-	φ (degree) =	31

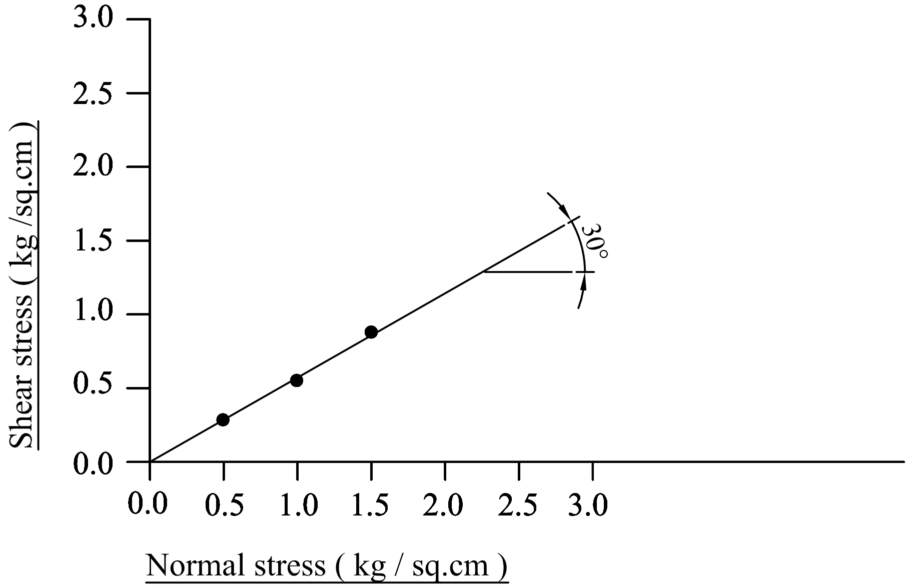
Direct Shear Plot



BH	GT 38	Depth(m.)	10.50	c(kg/cm^2) =	-	φ (degree) =	32

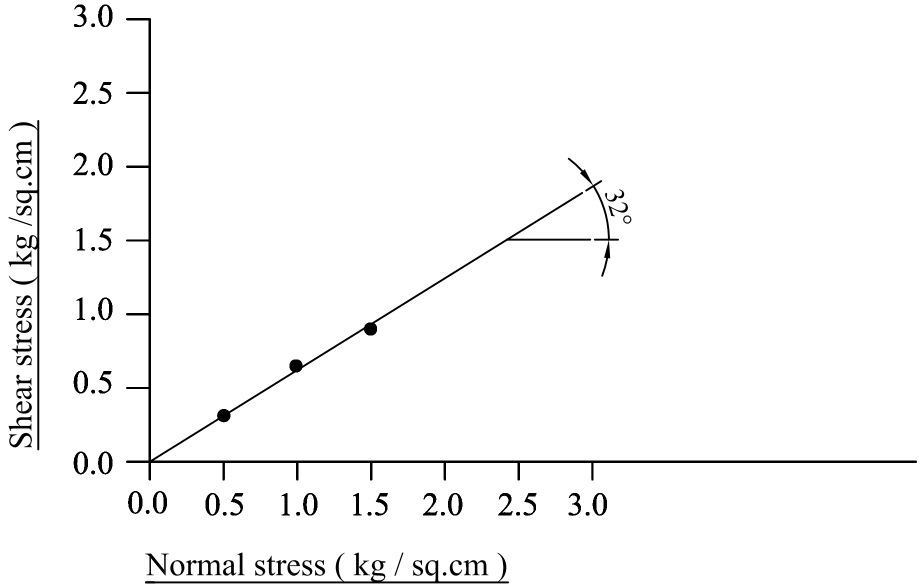
Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Direct Shear Plot



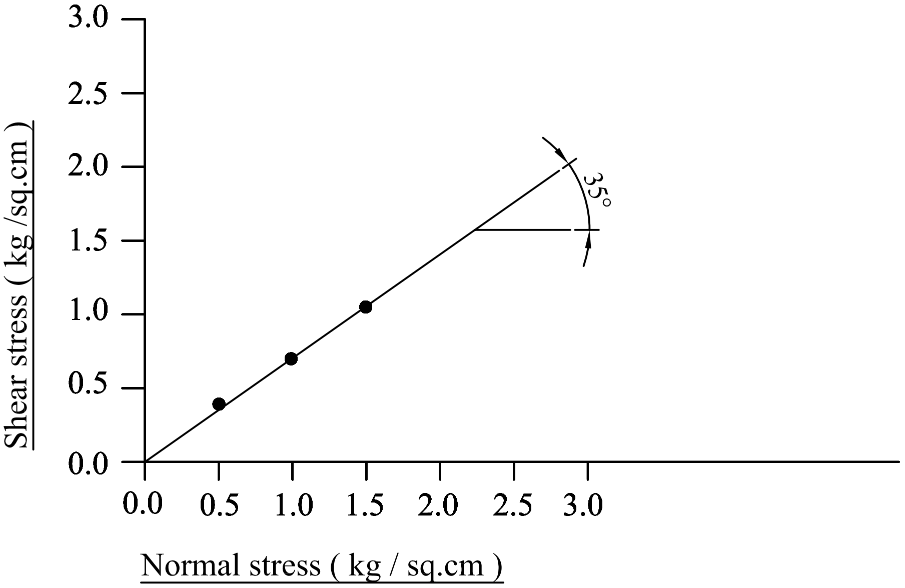
BH	GT 38	Depth(m.)	13.50	c(kg/cm^2) =	-	φ (degree) =	30

Direct Shear Plot



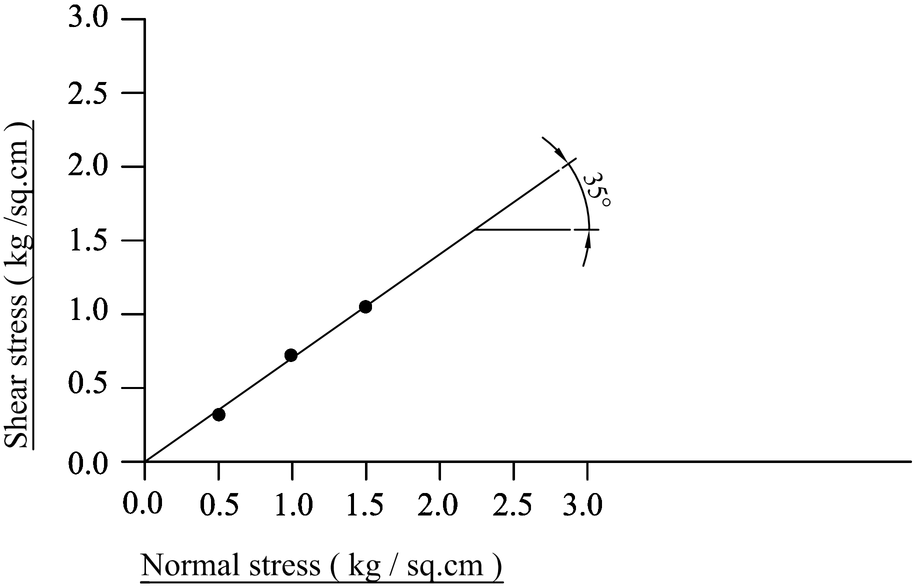
BH	GT 38	Depth(m.)	16.50	c(kg/cm^2) =	-	φ (degree) =	32

Direct Shear Plot



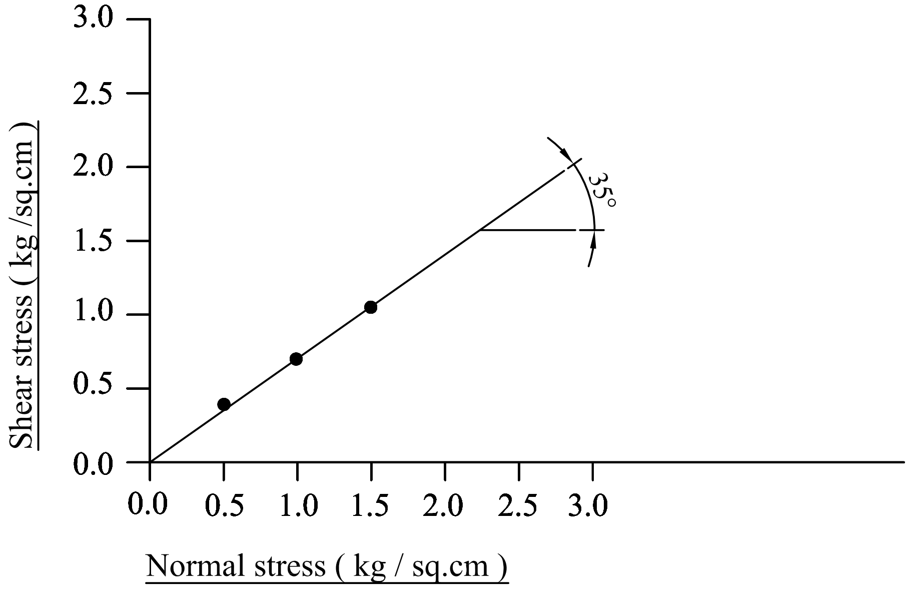
BH	GT 38	Depth(m.)	22.00	c(kg/cm^2) =	-	φ (degree) =	35

Direct Shear Plot



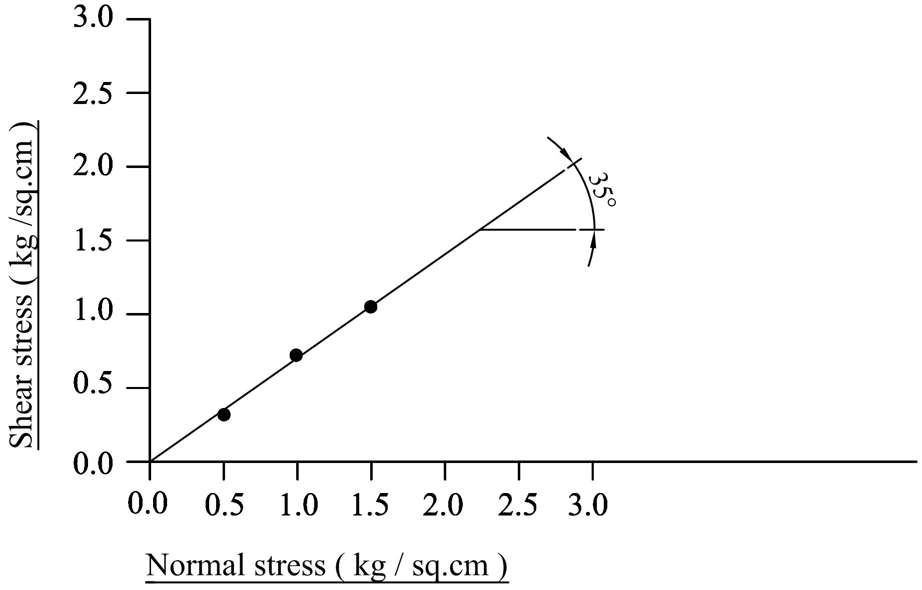
BH	GT 38	Depth(m.)	25.00	c(kg/cm^2) =	-	φ (degree) =	35

Direct Shear Plot



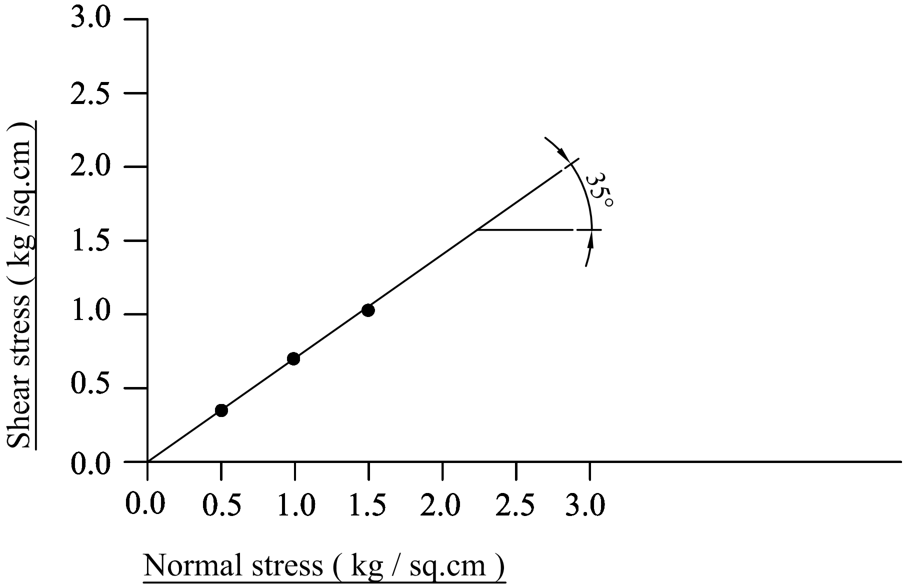
BH	GT 38	Depth(m.)	27.00	c(kg/cm^2) =	-	φ (degree) =	36

Direct Shear Plot



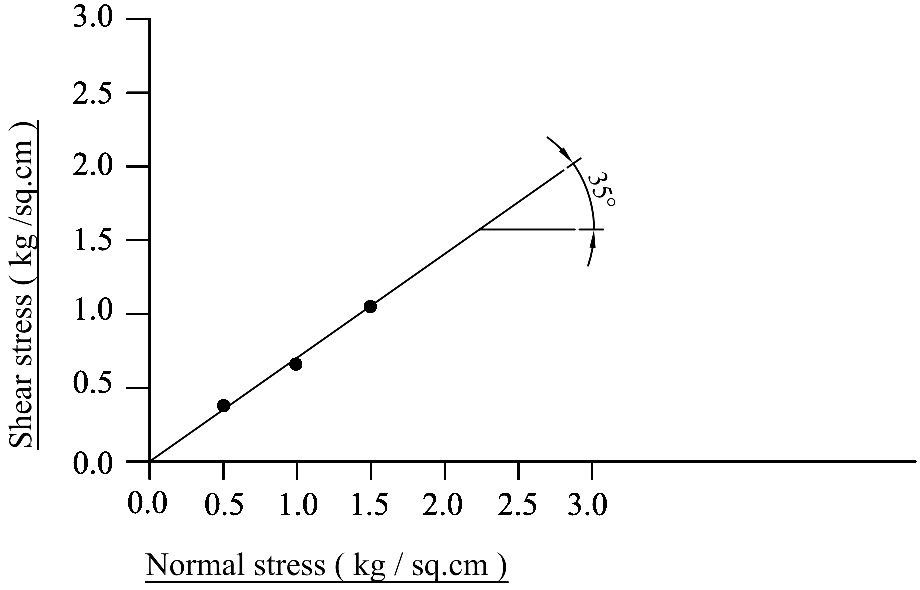
BH	GT 39	Depth(m.)	1.50	c(kg/cm^2) =	-	φ (degree) =	35

Direct Shear Plot



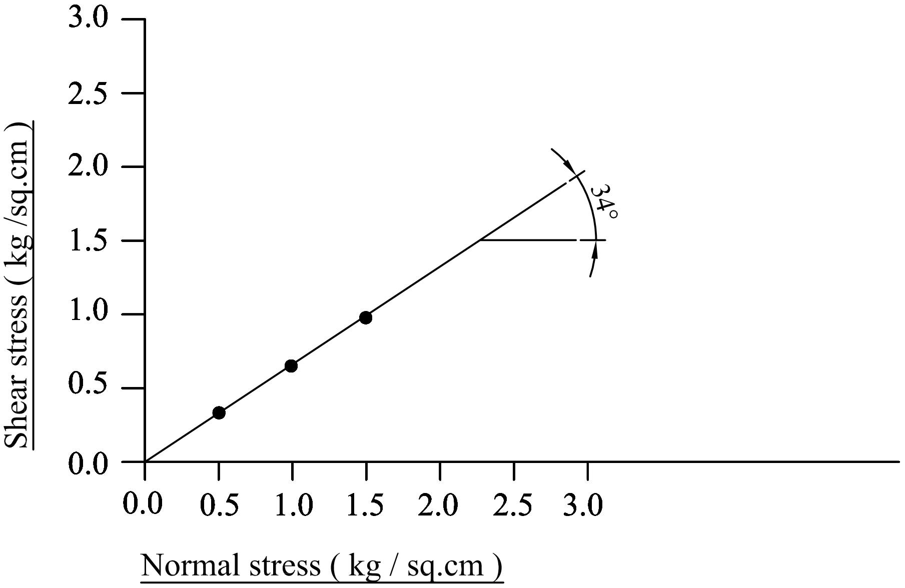
BH	GT 39	Depth(m.)	3.00	c(kg/cm^2) =	-	φ (degree) =	35

Direct Shear Plot



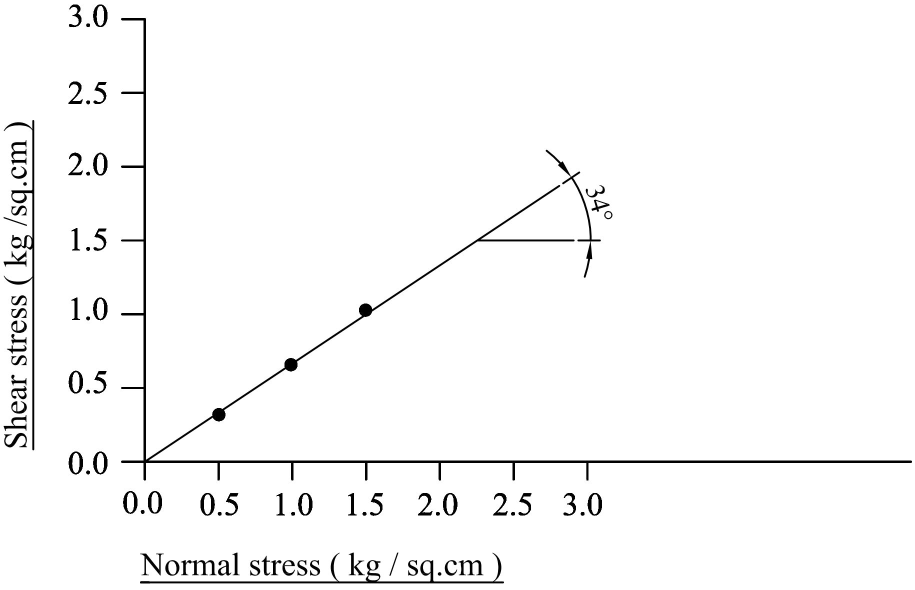
BH	GT 39	Depth(m.)	4.50	c(kg/cm^2) =	-	φ (degree) =	35

Direct Shear Plot



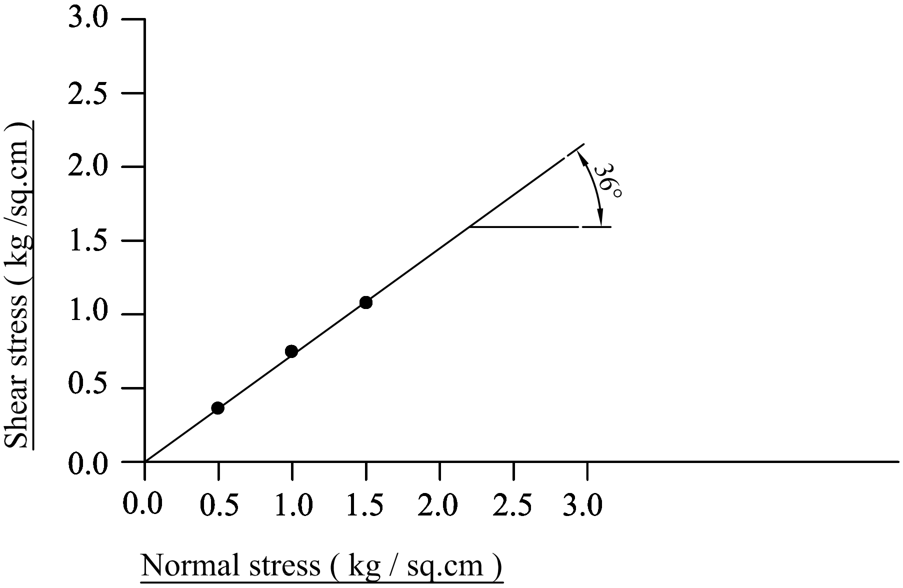
BH	GT 39	Depth(m.)	6.00	c(kg/cm^2) =	-	φ (degree) =	34

Direct Shear Plot



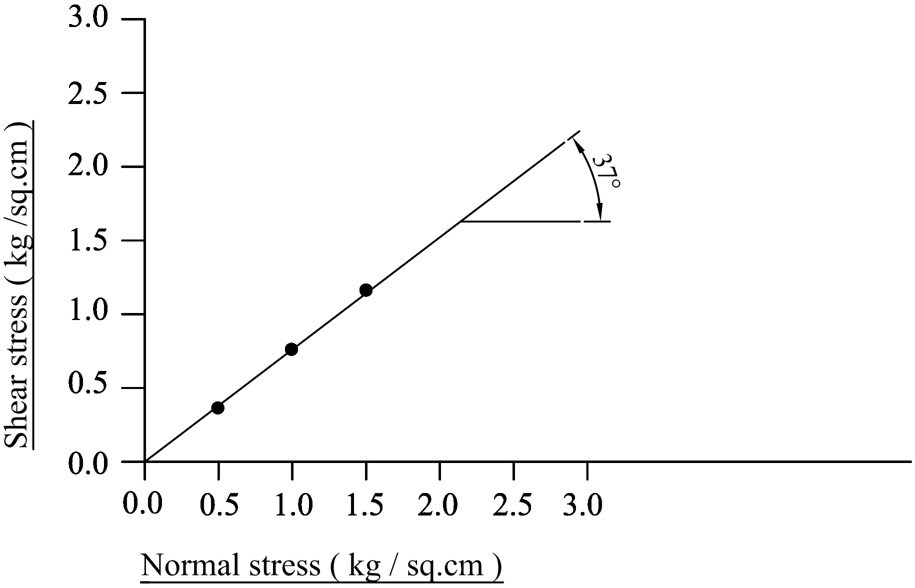
BH	GT 39	Depth(m.)	7.50	c(kg/cm^2) =	-	φ (degree) =	34

Direct Shear Plot



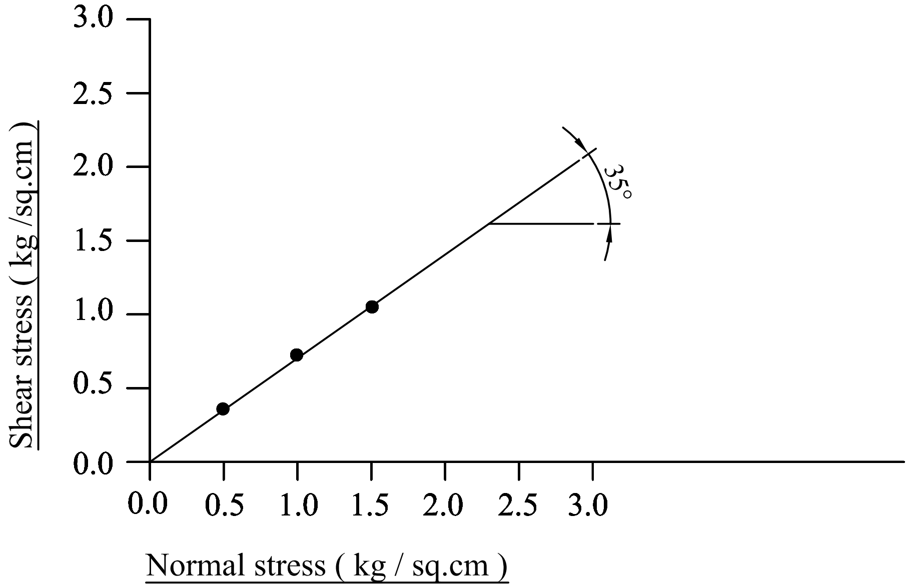
BH	GT 41	Depth(m.)	13.50	c(kg/cm^2) =	-	φ (degree) =	36

Direct Shear Plot



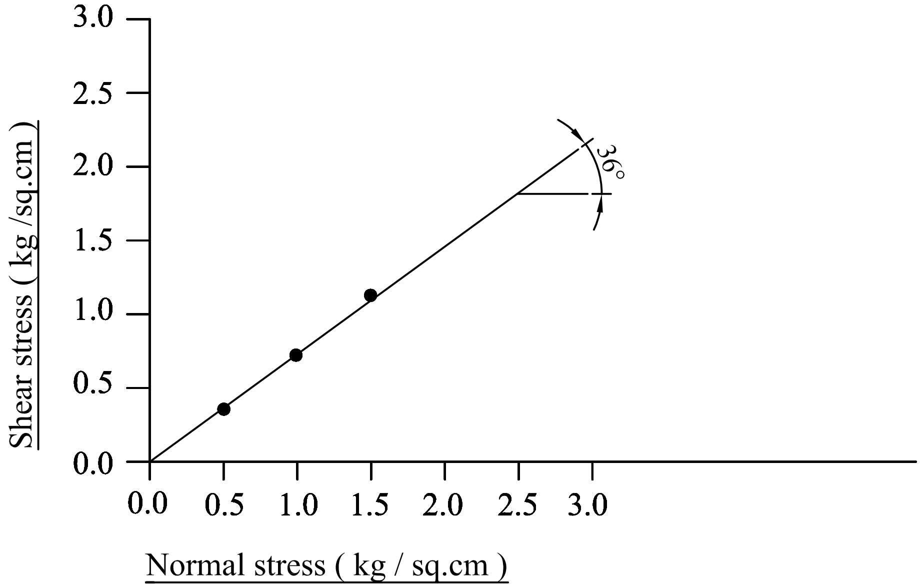
BH	GT 41	Depth(m.)	19.50	c(kg/cm^2) =	-	φ (degree) =	37

Direct Shear Plot



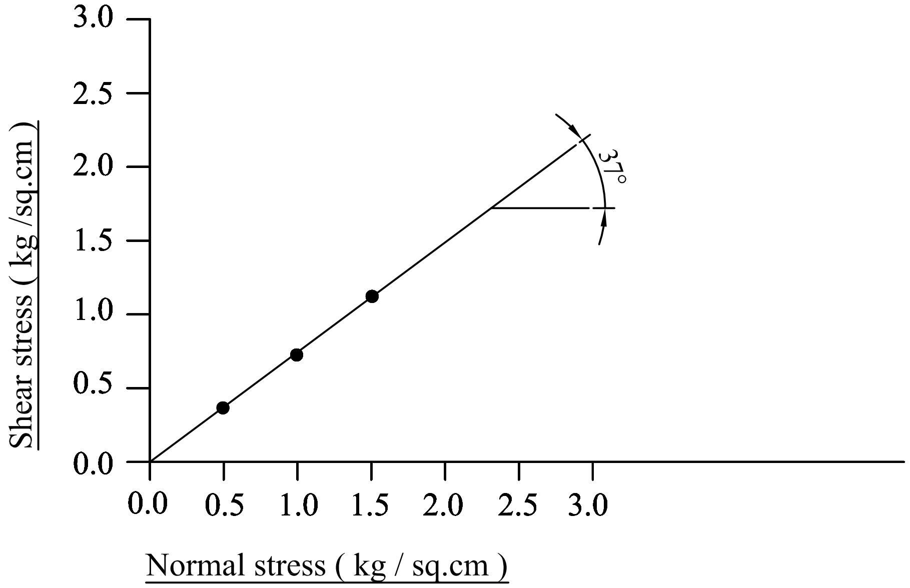
BH	GT 44A	Depth(m.)	1.50	c(kg/cm^2) =	-	φ (degree) =	35

Direct Shear Plot



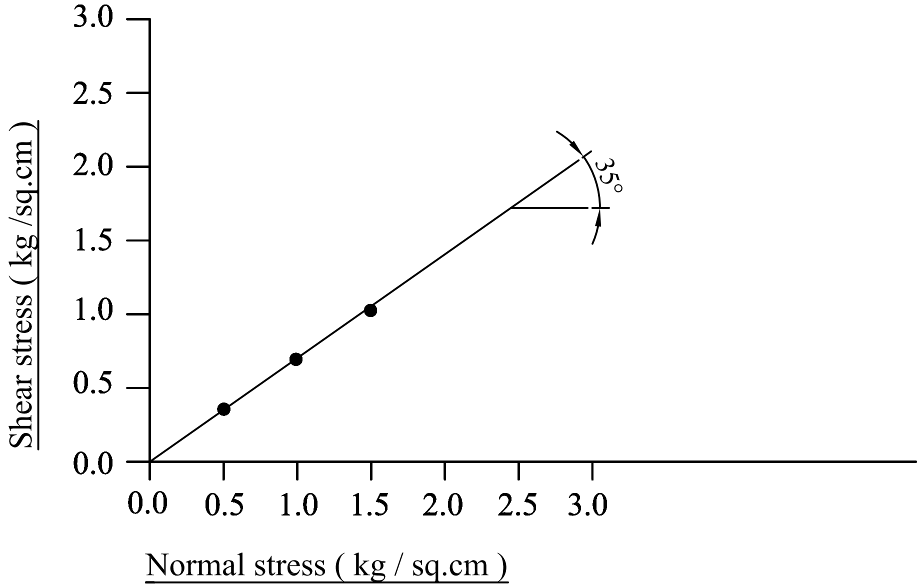
BH	GT 44A	Depth(m.)	4.50	c(kg/cm^2) =	-	φ (degree) =	36

Direct Shear Plot



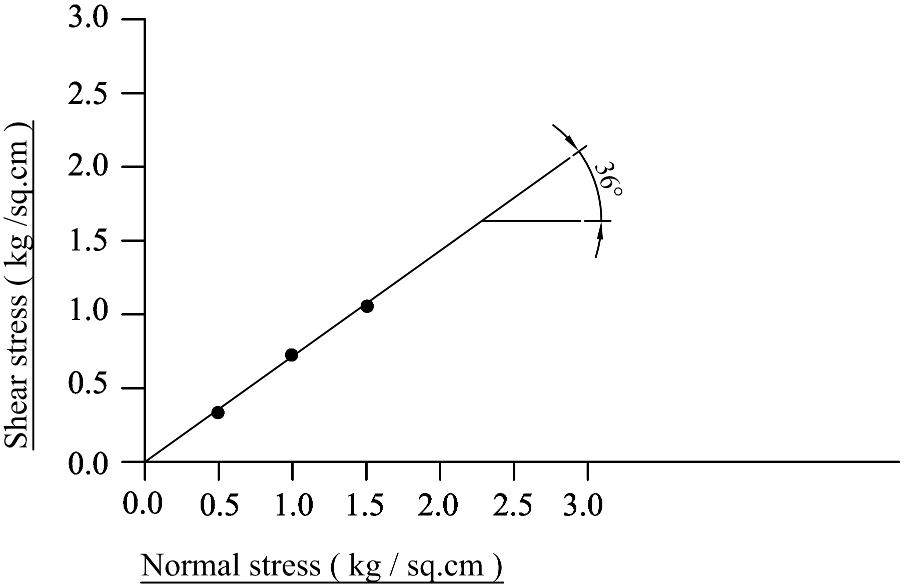
BH	GT 44A	Depth(m.)	6.00	c(kg/cm²) =	-	φ (degree) =	37

Direct Shear Plot



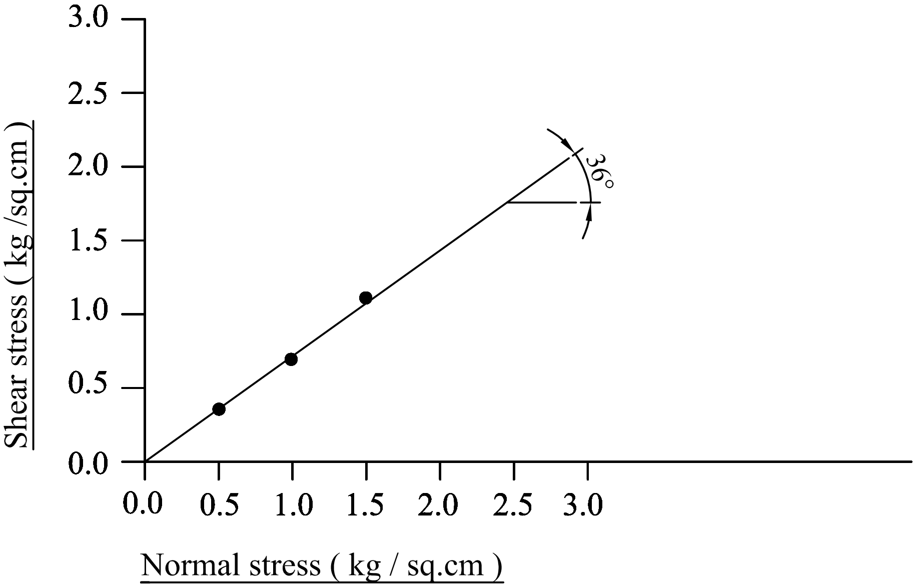
BH	GT 44B	Depth(m.)	2.00	c(kg/cm²) =	-	φ (degree) =	35

Direct Shear Plot



BH	GT 44B	Depth(m.)	5.00	c(kg/cm^2) =	-	φ (degree) =	36

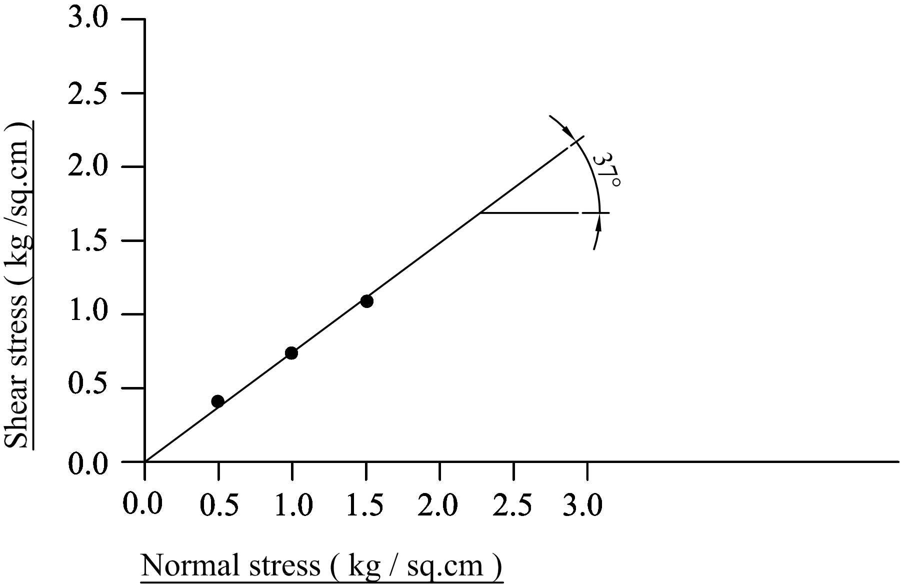
Direct Shear Plot



BH	GT 44B	Depth(m.)	8.00	c(kg/cm^2) =	-	φ (degree) =	36

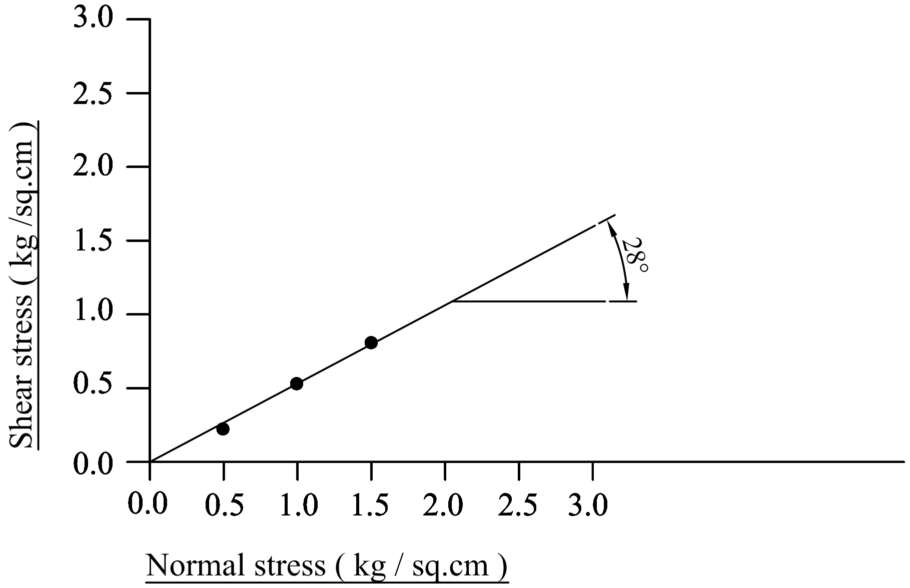
Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Direct Shear Plot



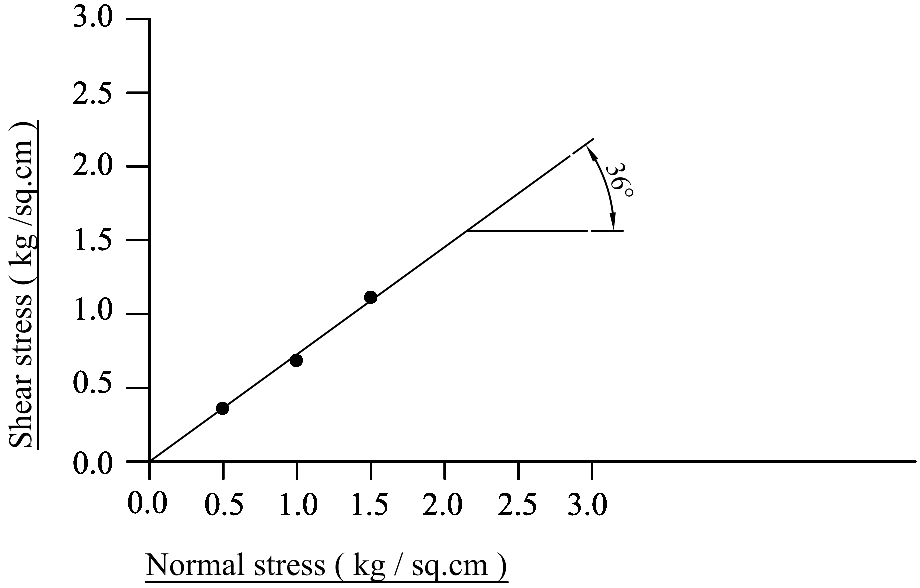
BH	GT 44B	Depth(m.)	15.50	c(kg/cm^2) =	-	φ (degree) =	37

Direct Shear Plot



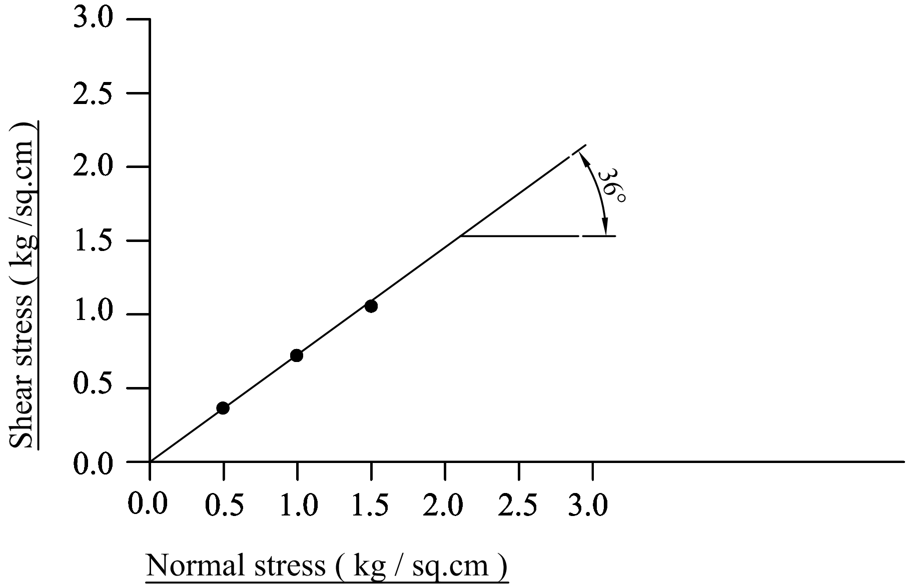
BH	GT 48	Depth(m.)	1.50	c(kg/cm^2) =	-	φ (degree) =	28

Direct Shear Plot



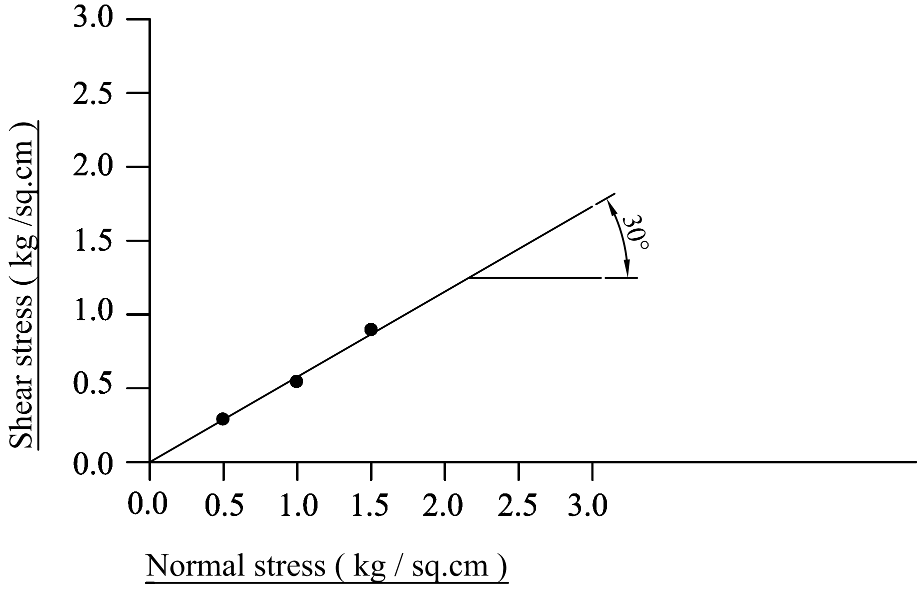
BH	GT 48	Depth(m.)	13.50	c(kg/cm^2) =	-	φ (degree) =	36

Direct Shear Plot



BH	GT 48	Depth(m.)	18.50	c(kg/cm²) =	-	φ (degree) =	36

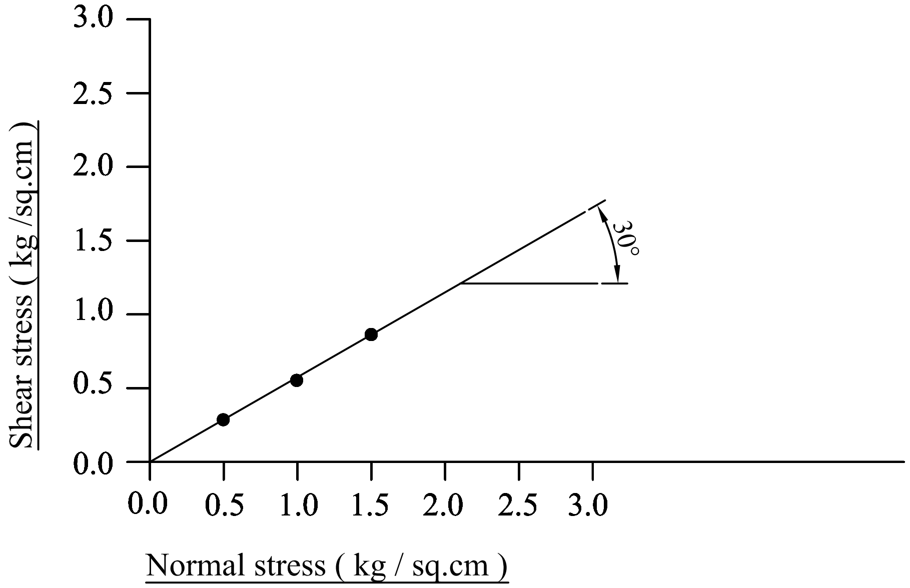
Direct Shear Plot



BH	GT 49	Depth(m.)	1.50	c(kg/cm²) =	-	φ (degree) =	30

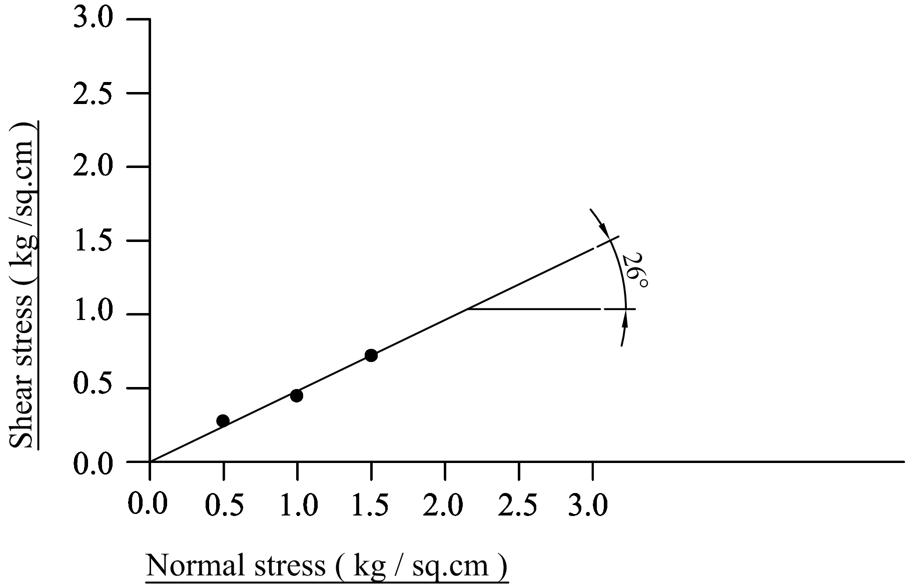
Project : Subsoil Investigation for Thiruvananthapuram-Kasaragod Semi-High-Speed Rail Corridor.

Direct Shear Plot



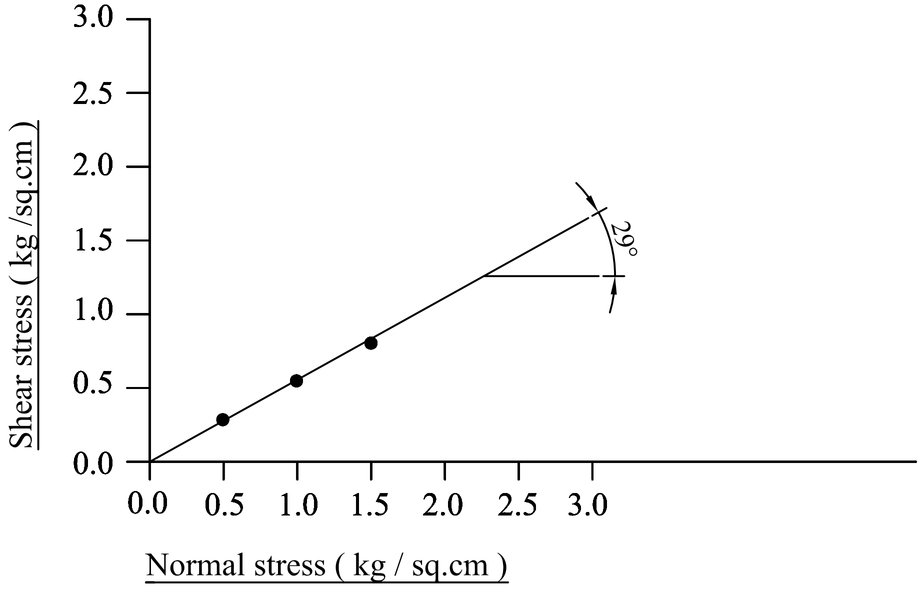
BH	GT 49	Depth(m.)	10.50	c(kg/cm²) =	-	φ (degree) =	30

Direct Shear Plot



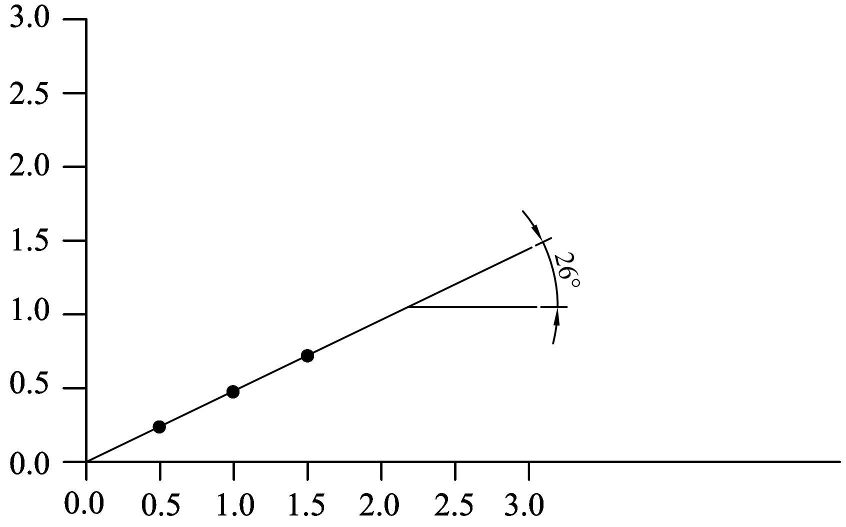
BH	GT 81	Depth(m.)	3.00	c(kg/cm^2) =	-	φ (degree) =	25

Direct Shear Plot



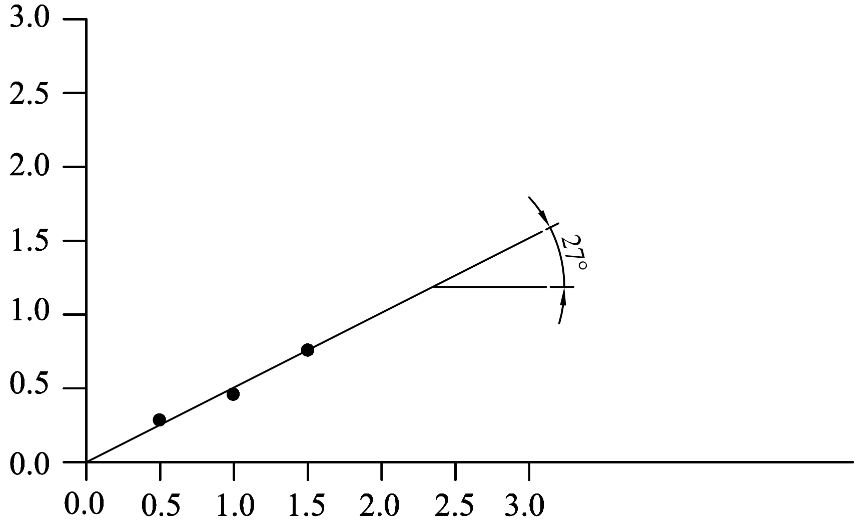
BH	GT 81	Depth(m.)	6.00	c(kg/cm^2) =	-	φ (degree) =	29

Direct Shear Plot



BH	GT 82	Depth(m.)	3.00	c(kg/cm^2) =	-	φ (degree) =	26

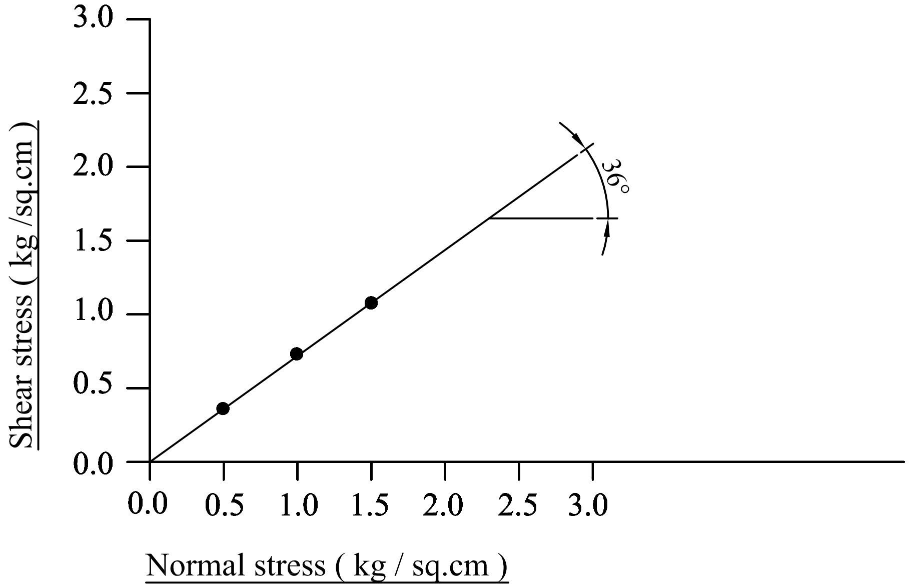
Direct Shear Plot



-

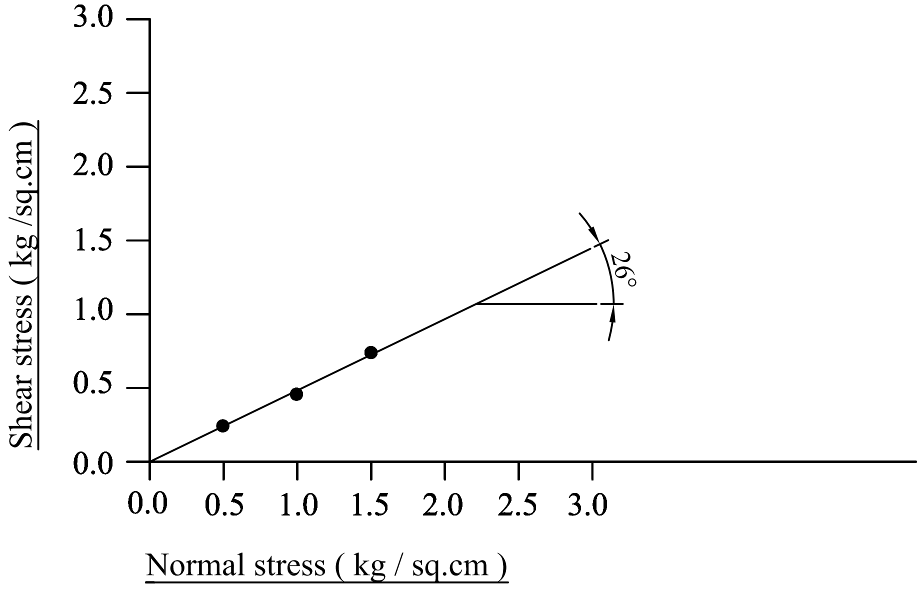
BH	GT 83	Depth(m.)	1.50	c(kg/cm^2) =	-	φ (degree) =	

Direct Shear Plot



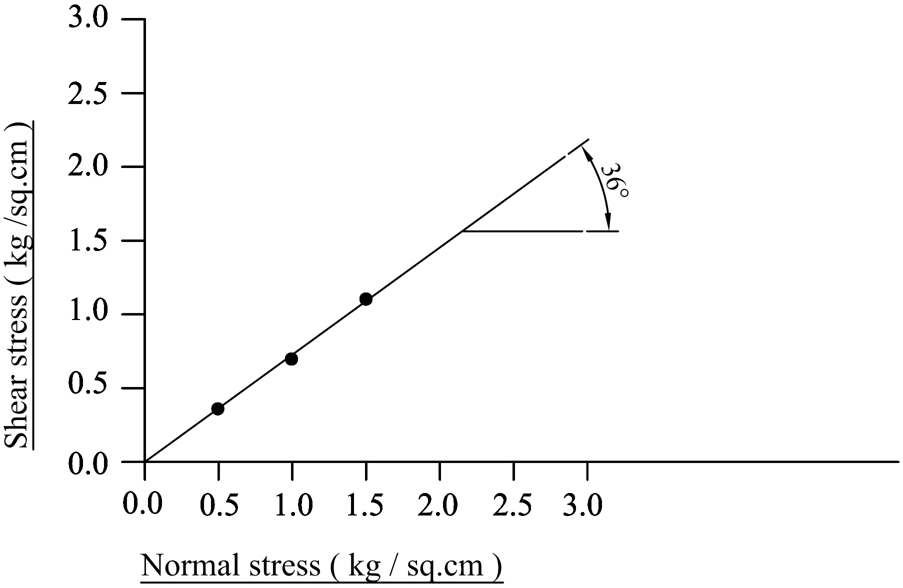
BH	GT 83	Depth(m.)	16.50	c(kg/cm^2) =	-	φ (degree) =	36

Direct Shear Plot



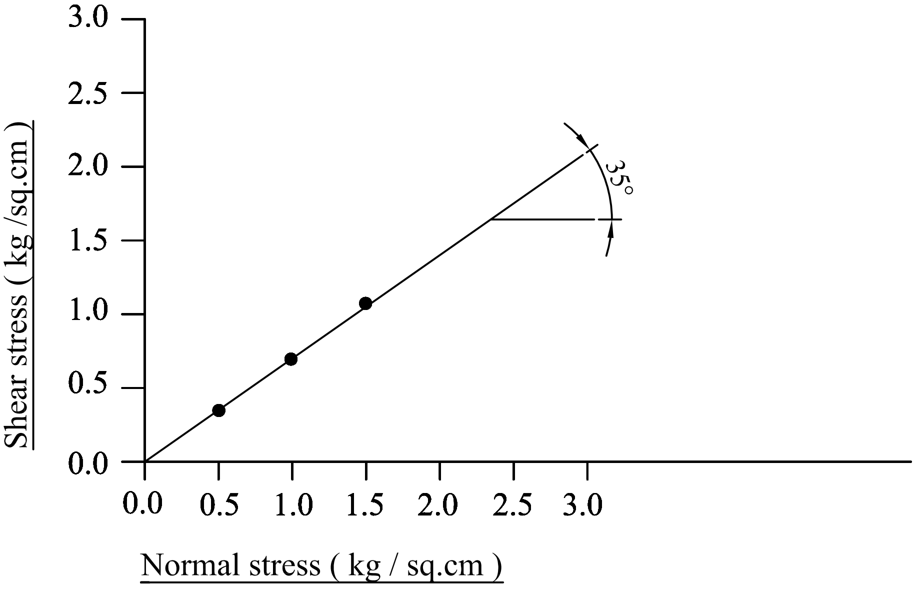
BH	GT 84	Depth(m.)	3.00	c(kg/cm^2) =	-	φ (degree) =	26

Direct Shear Plot



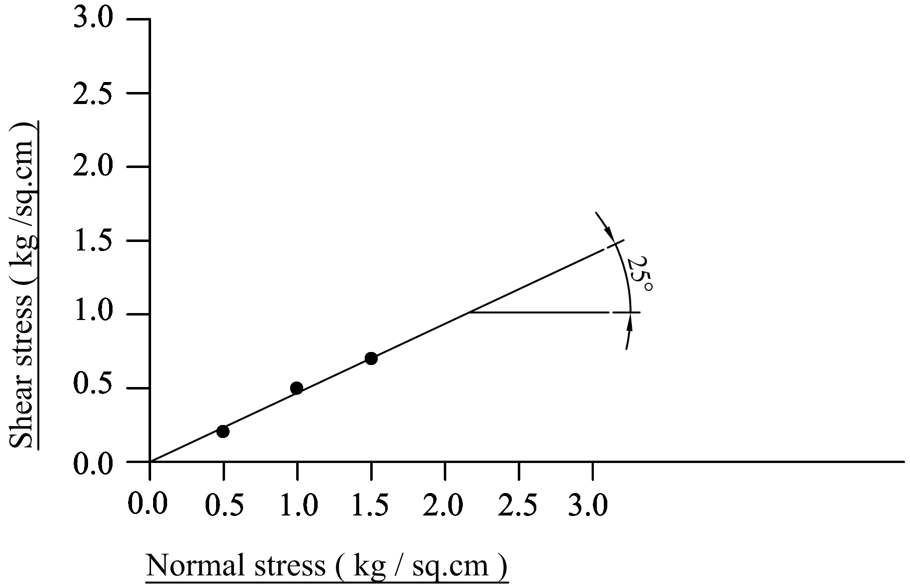
BH	GT 84	Depth(m.)	10.50	c(kg/cm²) =	-	φ (degree) =	36

Direct Shear Plot



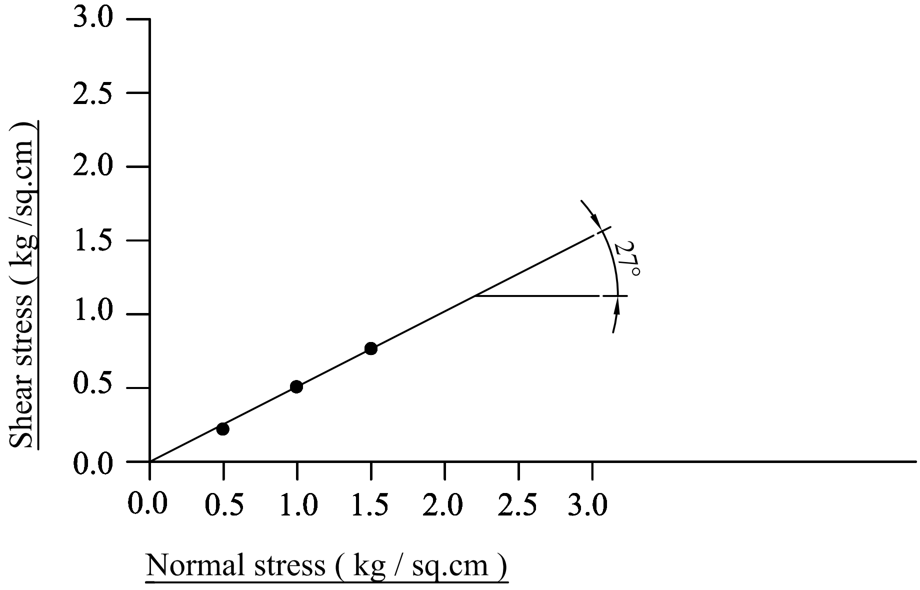
BH	GT 84	Depth(m.)	16.50	c(kg/cm²) =	-	φ (degree) =	35

Direct Shear Plot



BH	GT 85	Depth(m.)	1.50	c(kg/cm^2) =	-	φ (degree) =	25

Direct Shear Plot

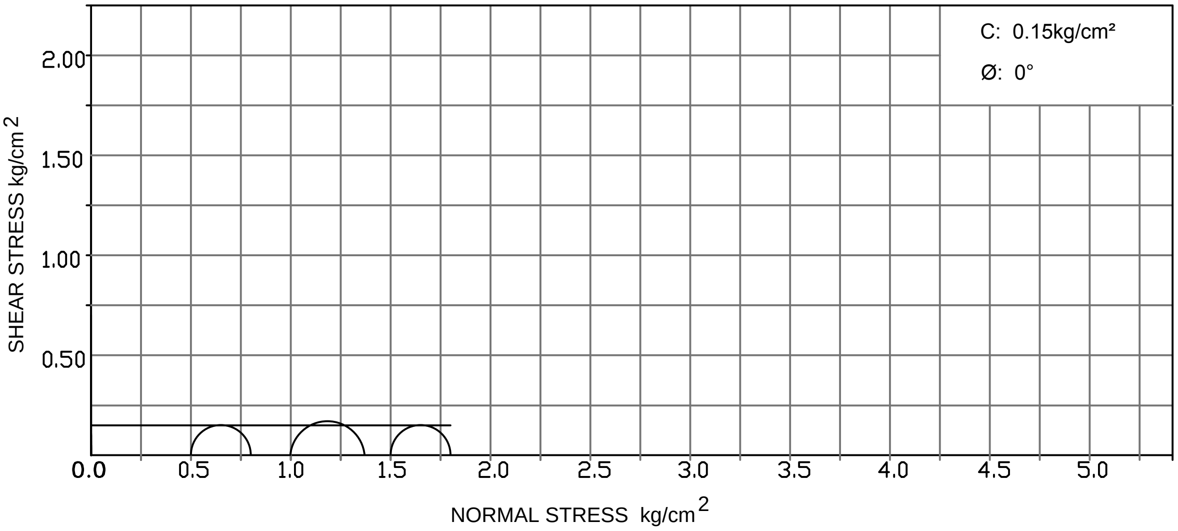


BH	GT 85	Depth(m.)	4.50	c(kg/cm^2) =	-	φ (degree) =	27

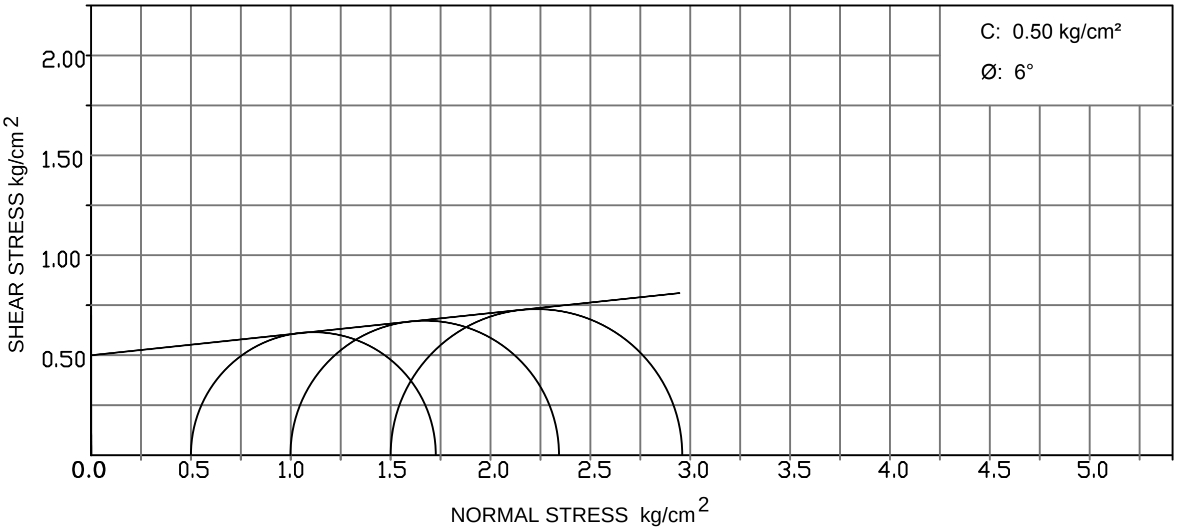
Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor.

MOHR-COULOMB FAILURE ENVELOPE

BOREHOLE NO: GT 50B DEPTH (m):3.0-3.45



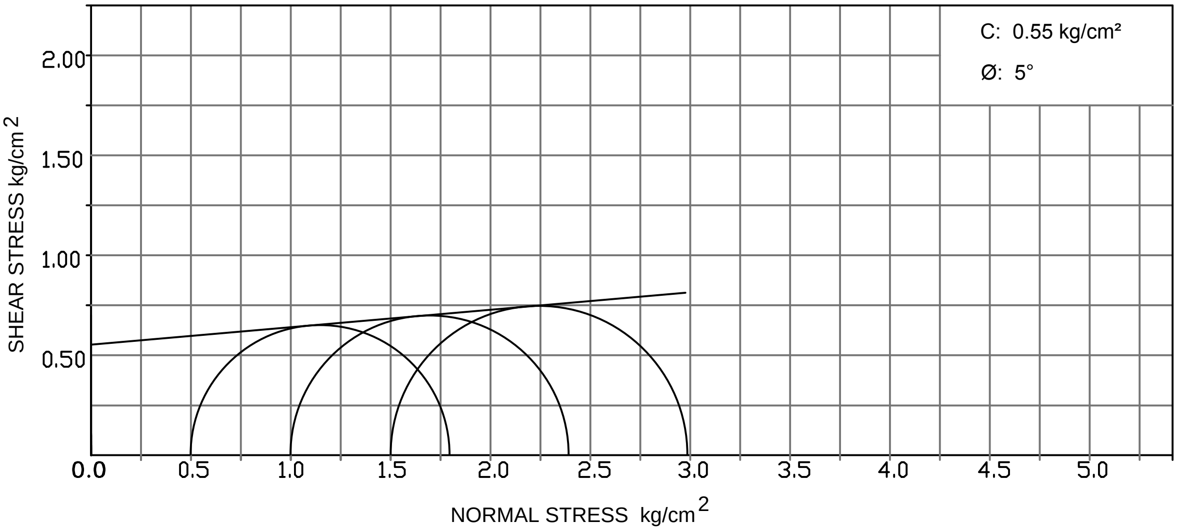
BOREHOLE NO: GT 50B DEPTH (m):6.0-6.45



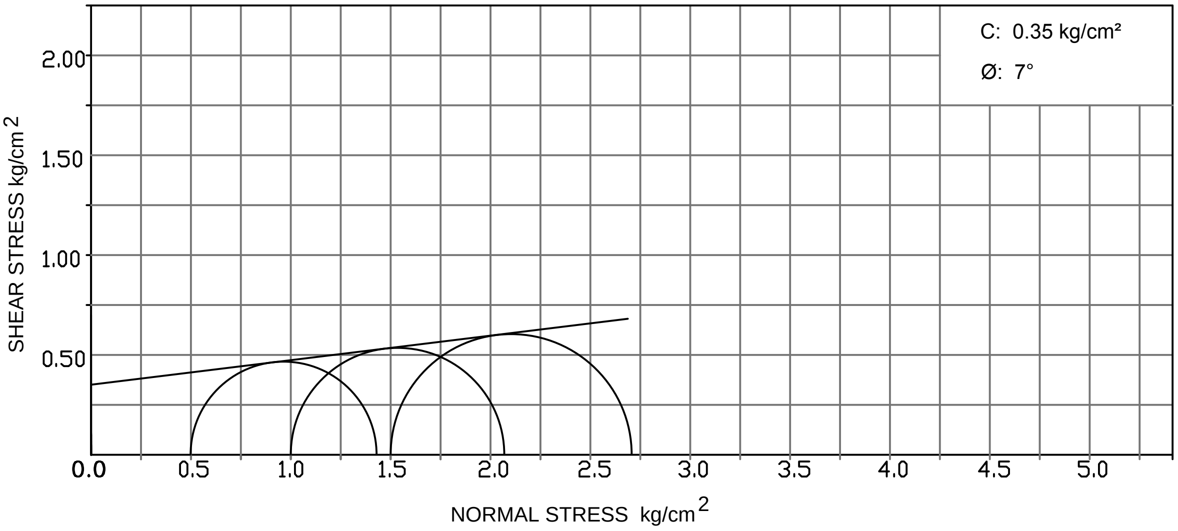
Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor.

MOHR-COULOMB FAILURE ENVELOPE

BOREHOLE NO: GT 55A DEPTH (m):3.0-3.45



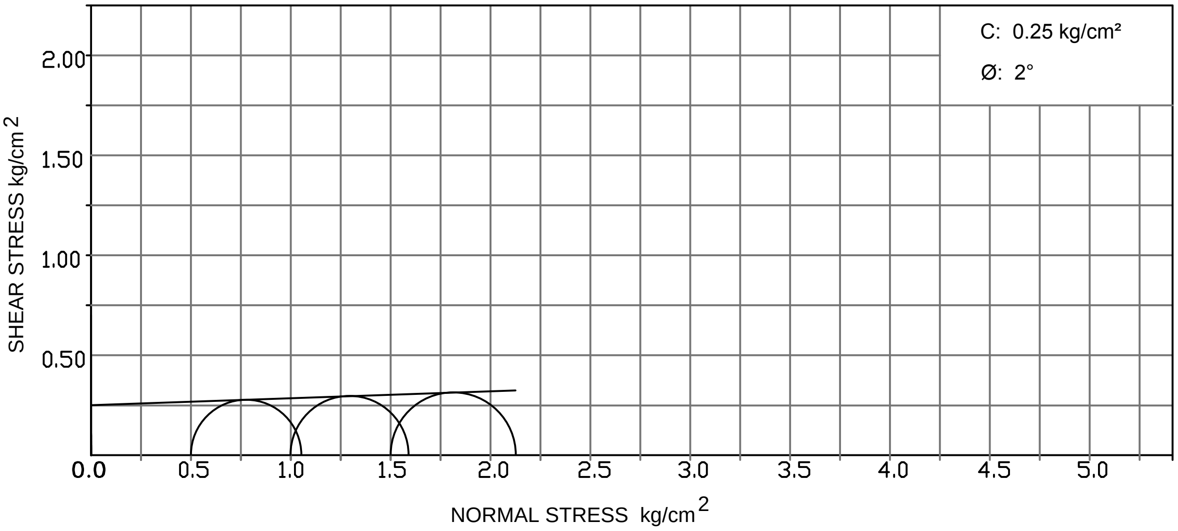
BOREHOLE NO: GT 75A DEPTH (m):4.15-4.60



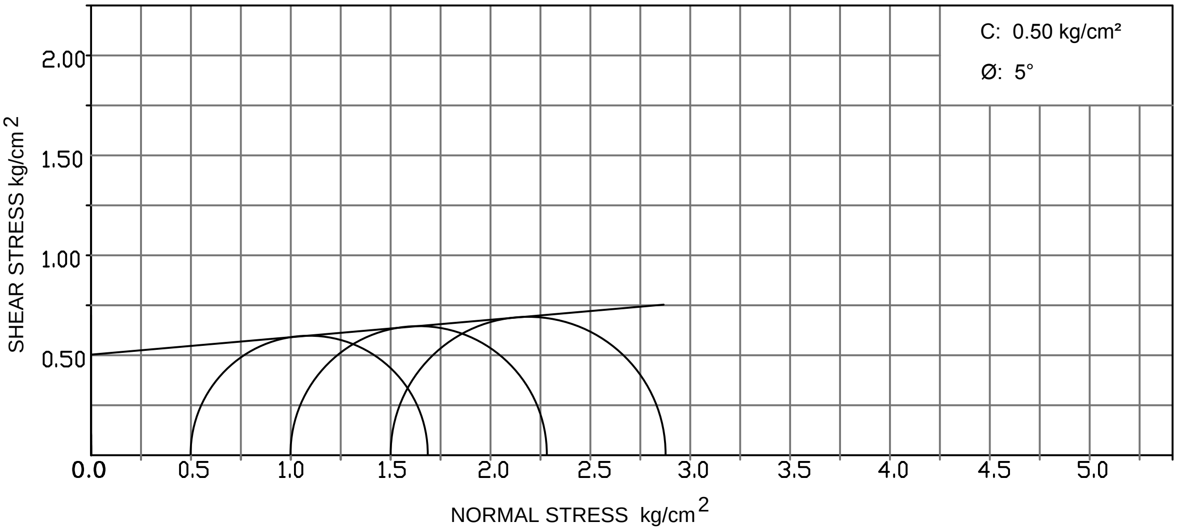
Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor.

MOHR-COULOMB FAILURE ENVELOPE

BOREHOLE NO: GT 102 DEPTH (m):3.0-3.45



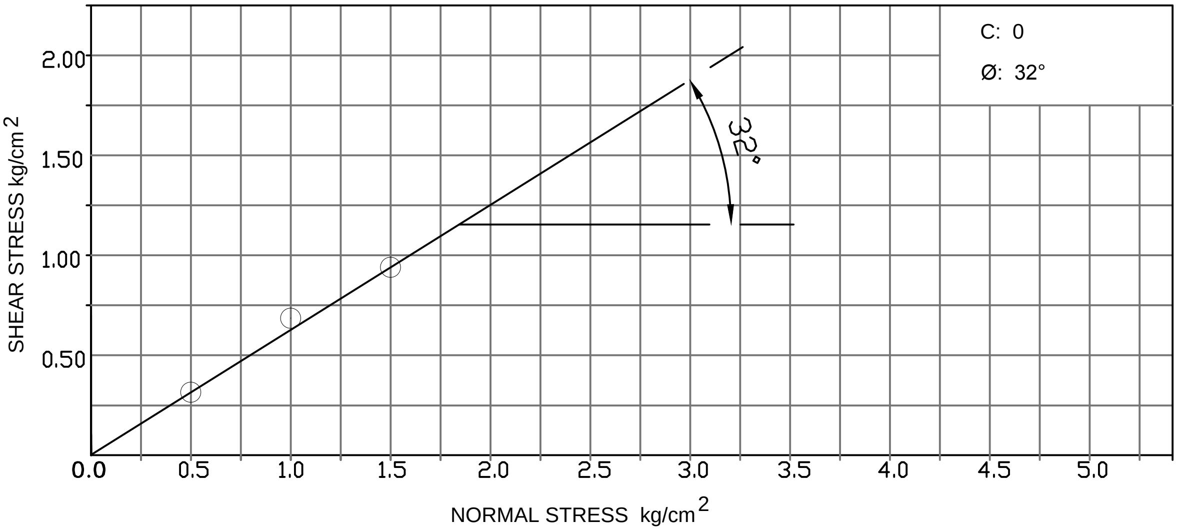
BOREHOLE NO: GT 103A DEPTH (m):3.0-3.45



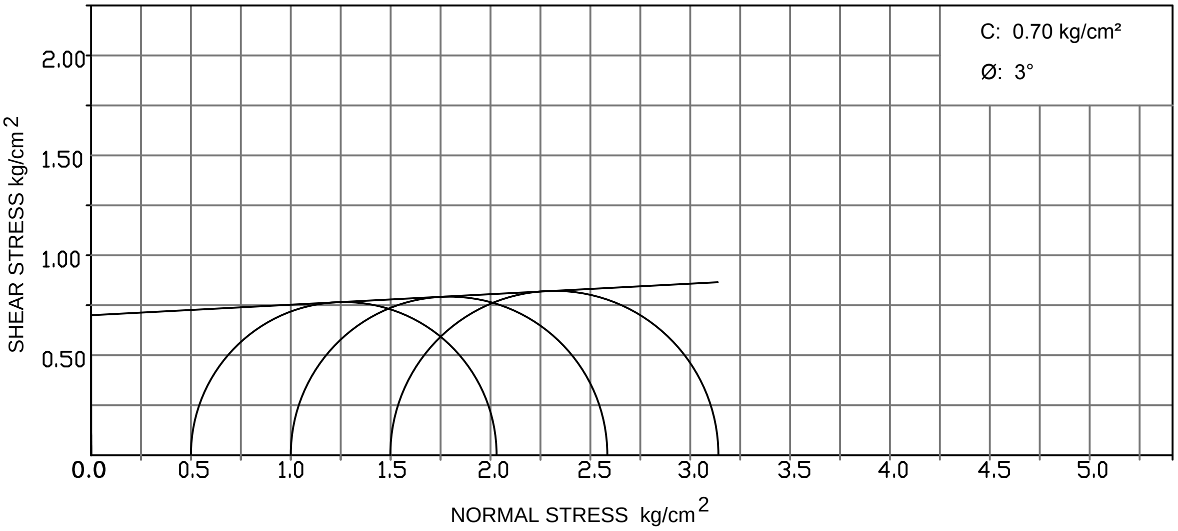
Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor.

MOHR-COULOMB FAILURE ENVELOPE

BOREHOLE NO: GT 101A DEPTH (m):6.0-6.45



BOREHOLE NO: GT109 DEPTH (m):12.0-12.45

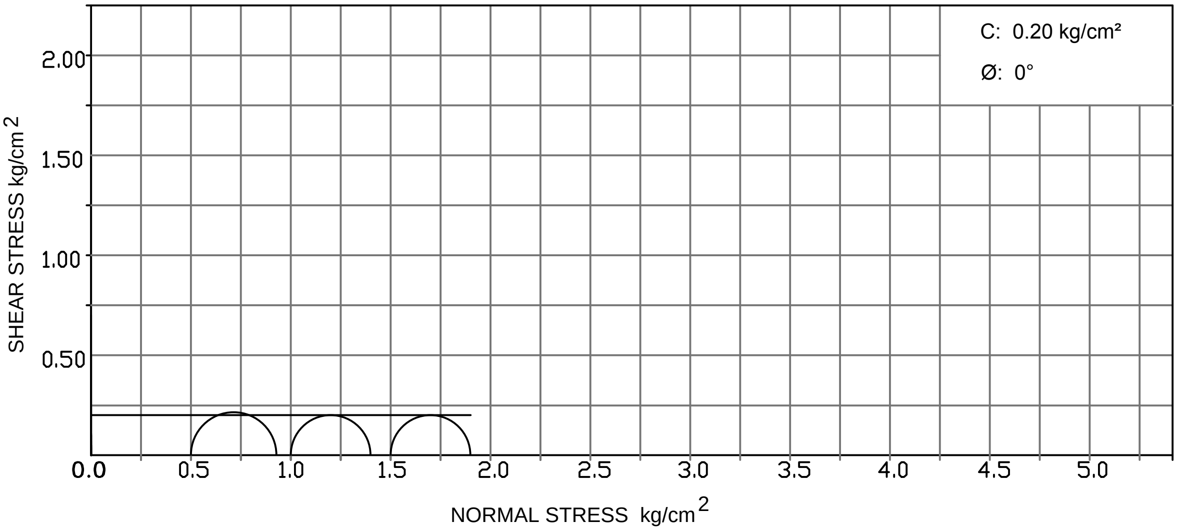


M/s ANAND RAJ INFRATECH PVT. LTD.

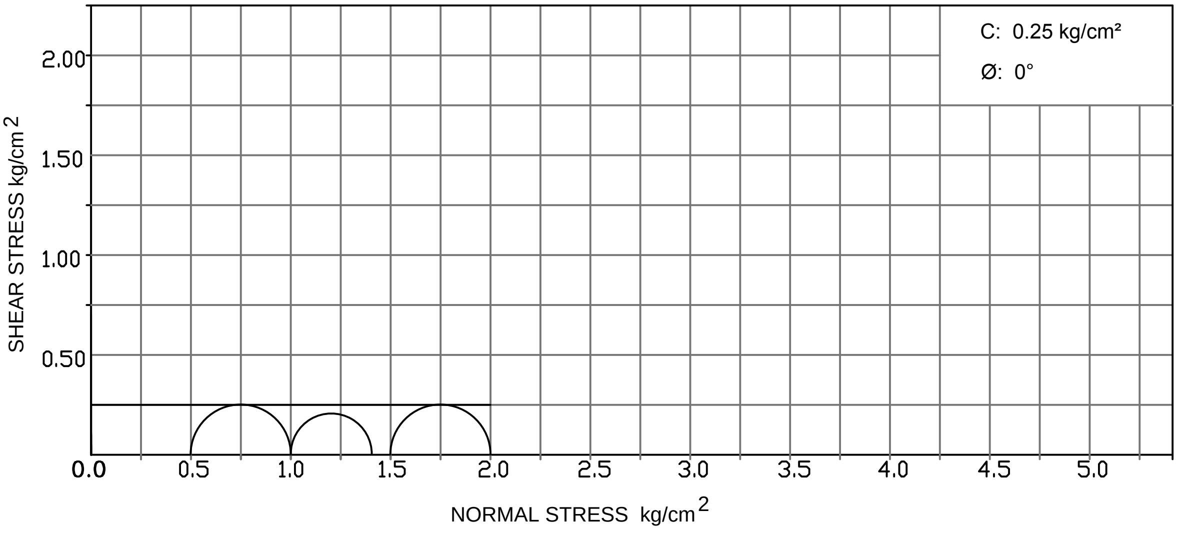
Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor.

MOHR-COULOMB FAILURE ENVELOPE

BOREHOLE NO: GT 51A DEPTH (m):6.0-6.45



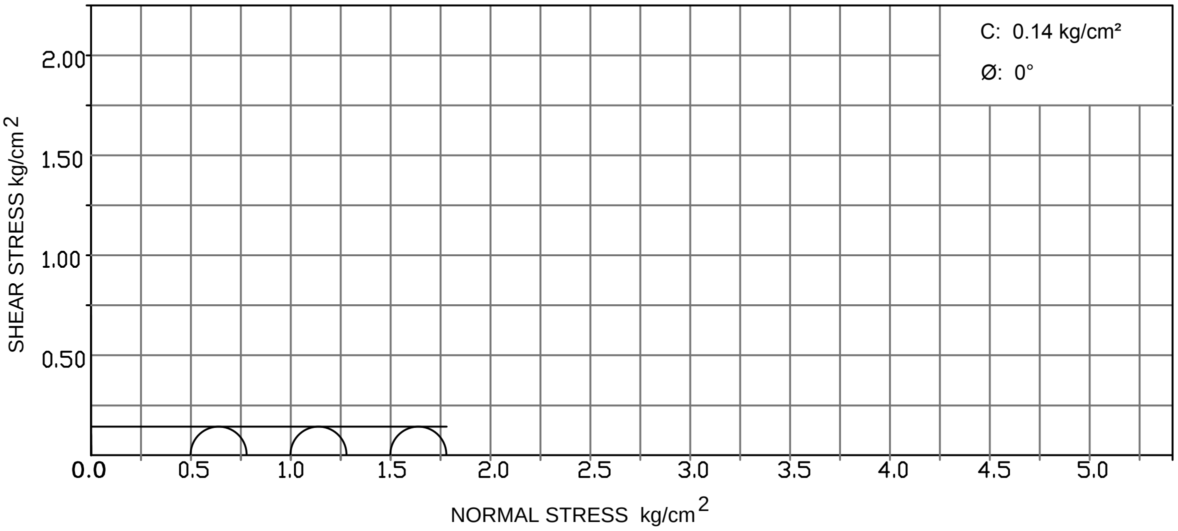
BOREHOLE NO: GT 51A DEPTH (m):13.50-13.95



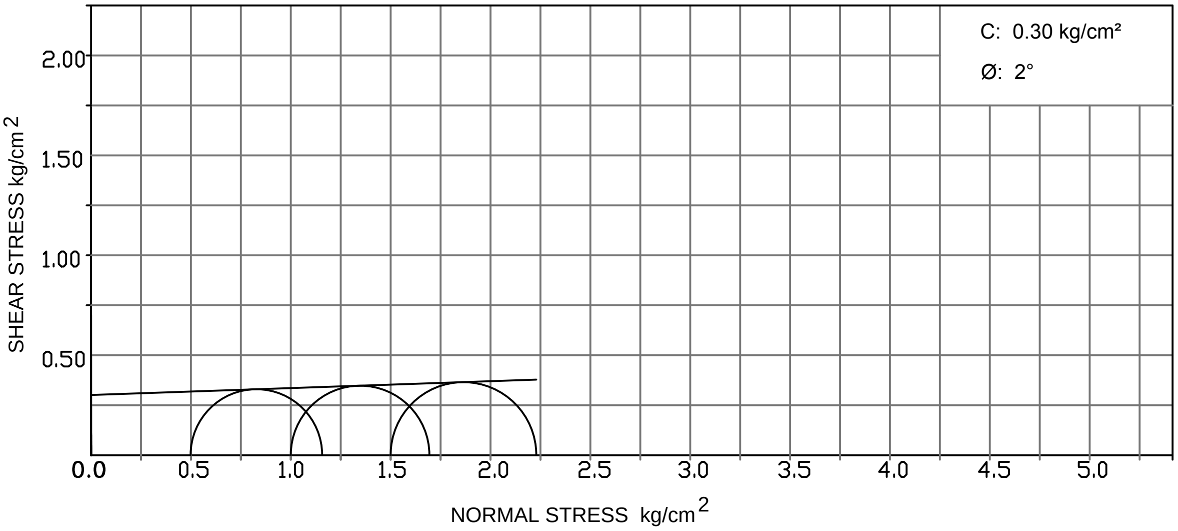
Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor.

MOHR-COULOMB FAILURE ENVELOPE

BOREHOLE NO: GT 75A DEPTH (m):6.50-6.95



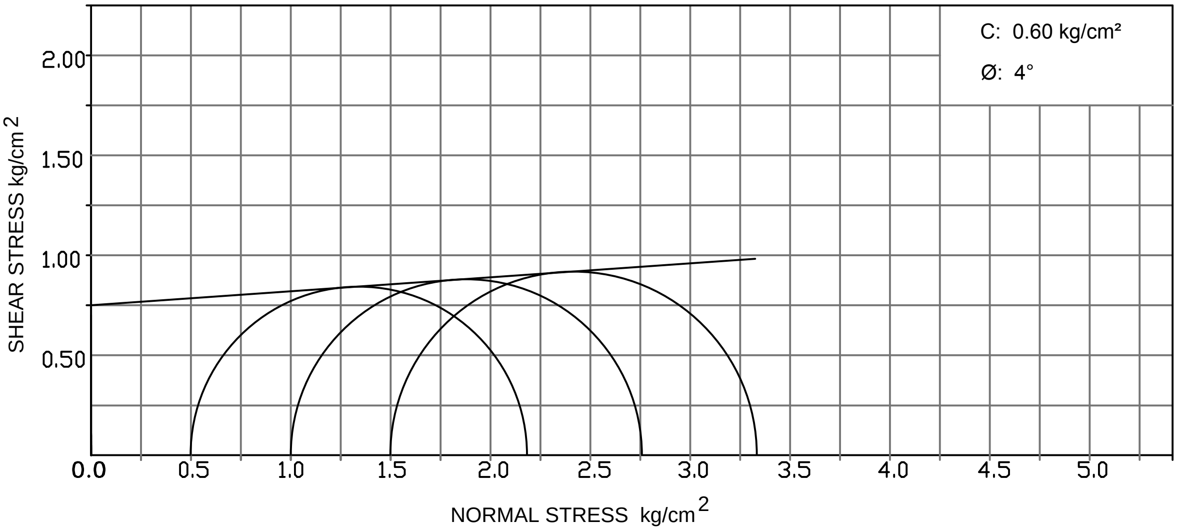
BOREHOLE NO: GT 79 DEPTH (m):11.0-11.45



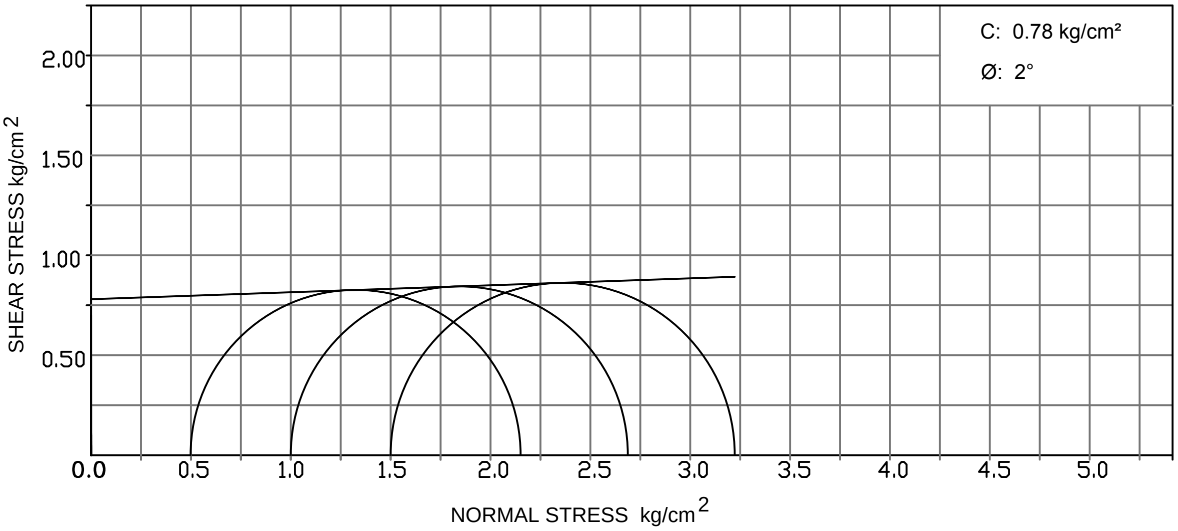
Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor.

MOHR-COULOMB FAILURE ENVELOPE

BOREHOLE NO: GT 103A DEPTH (m):7.50-7.95



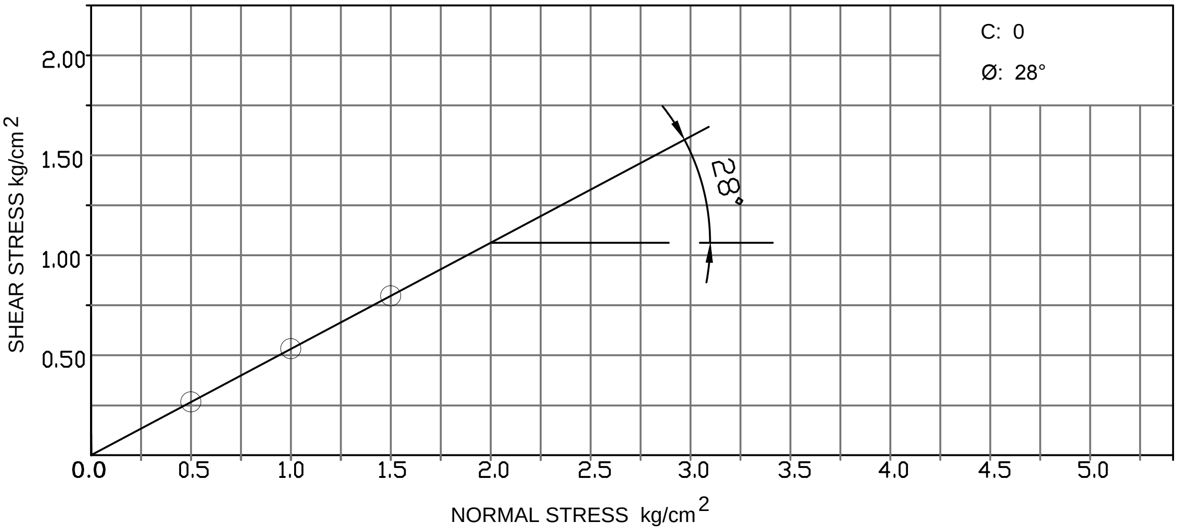
BOREHOLE NO: GT 108A DEPTH (m):13.50-13.95



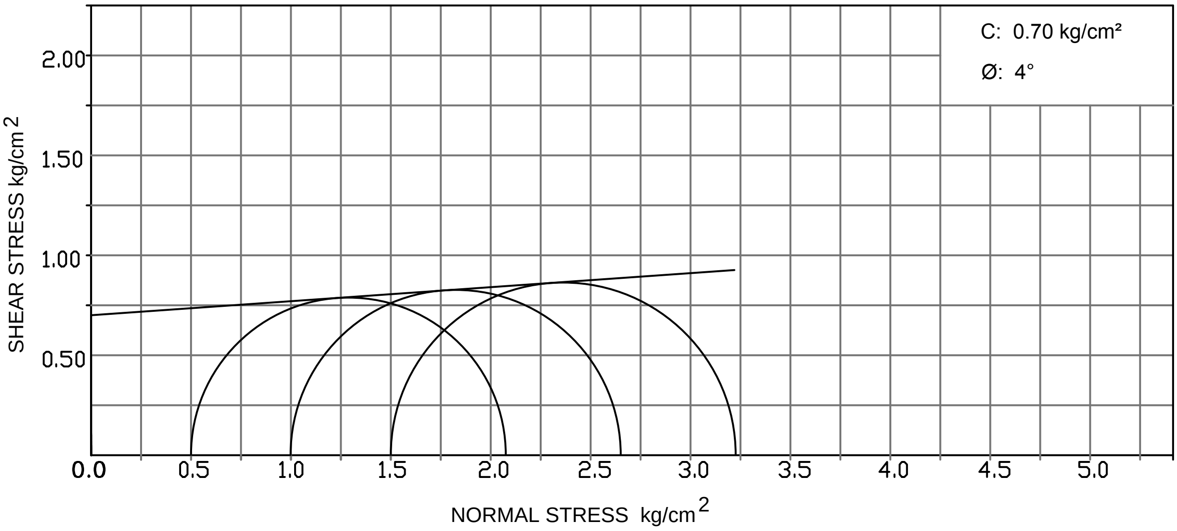
Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor.

MOHR-COULOMB FAILURE ENVELOPE

BOREHOLE NO: GT 110 DEPTH (m):3.0-3.45



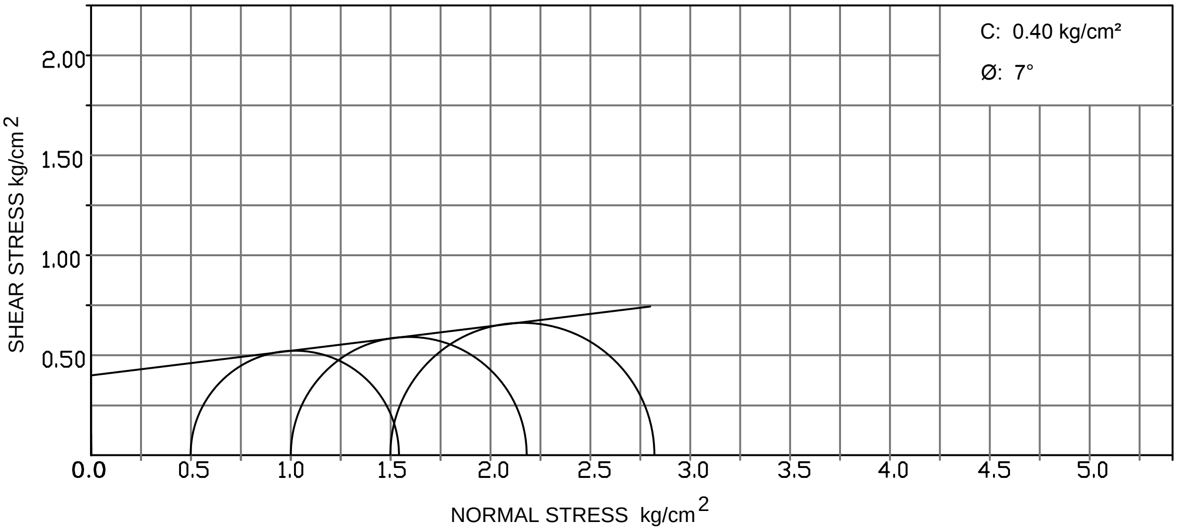
BOREHOLE NO: GT 113 DEPTH (m):7.50-7.95



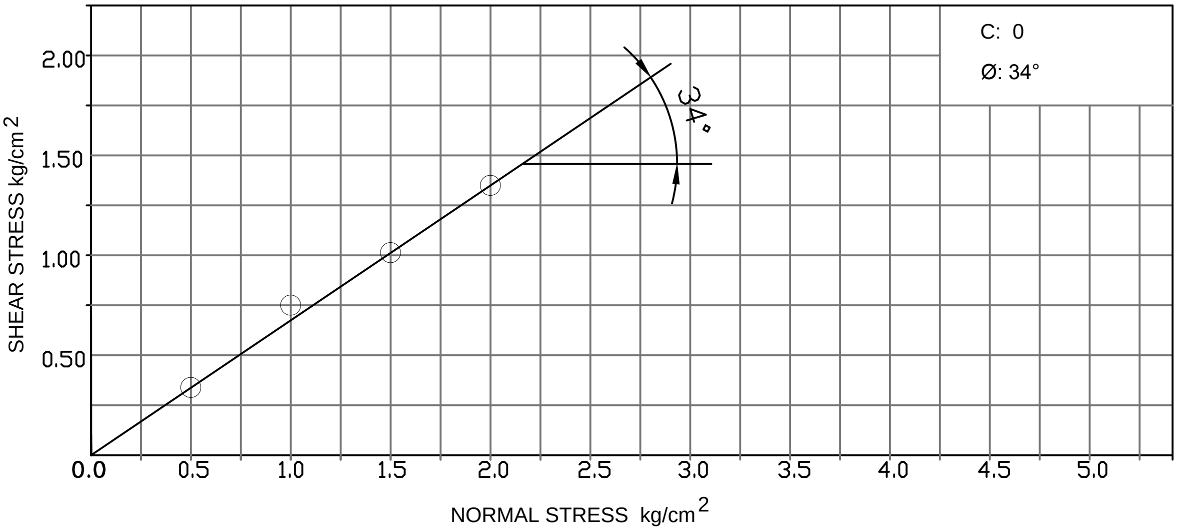
Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor.

MOHR-COULOMB FAILURE ENVELOPE

BOREHOLE NO: GT 52A DEPTH (m):3.0-3.45



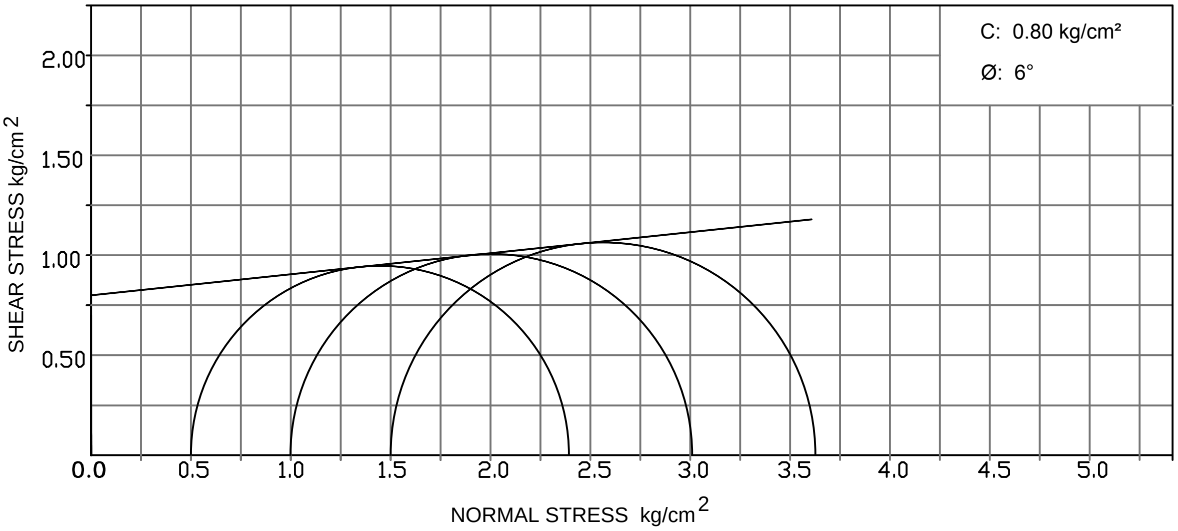
BOREHOLE NO: GT 54 DEPTH (m):22.50-22.95



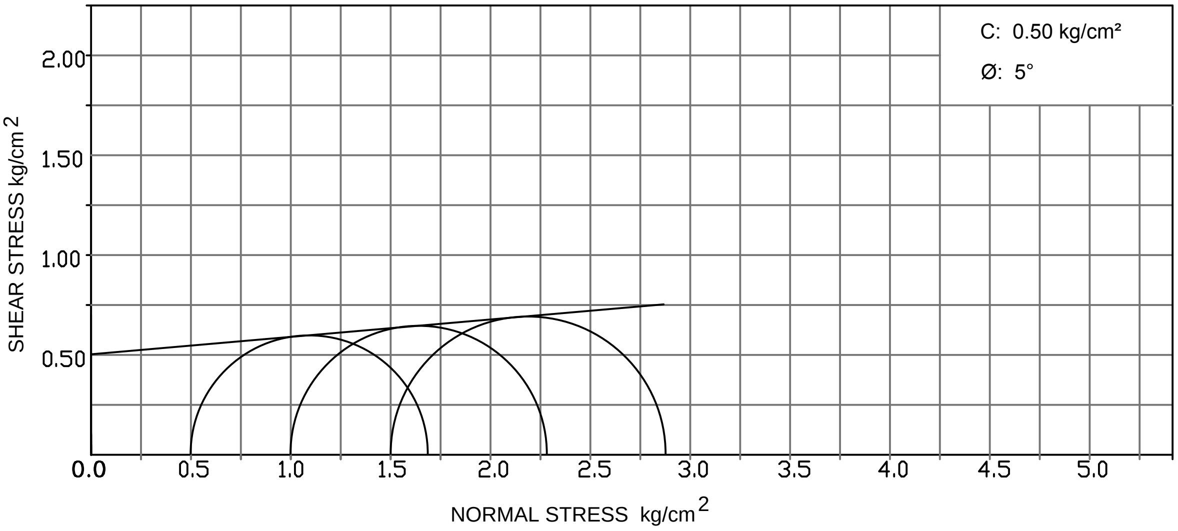
Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor.

MOHR-COULOMB FAILURE ENVELOPE

BOREHOLE NO: GT 115 DEPTH (m):7.50-7.95



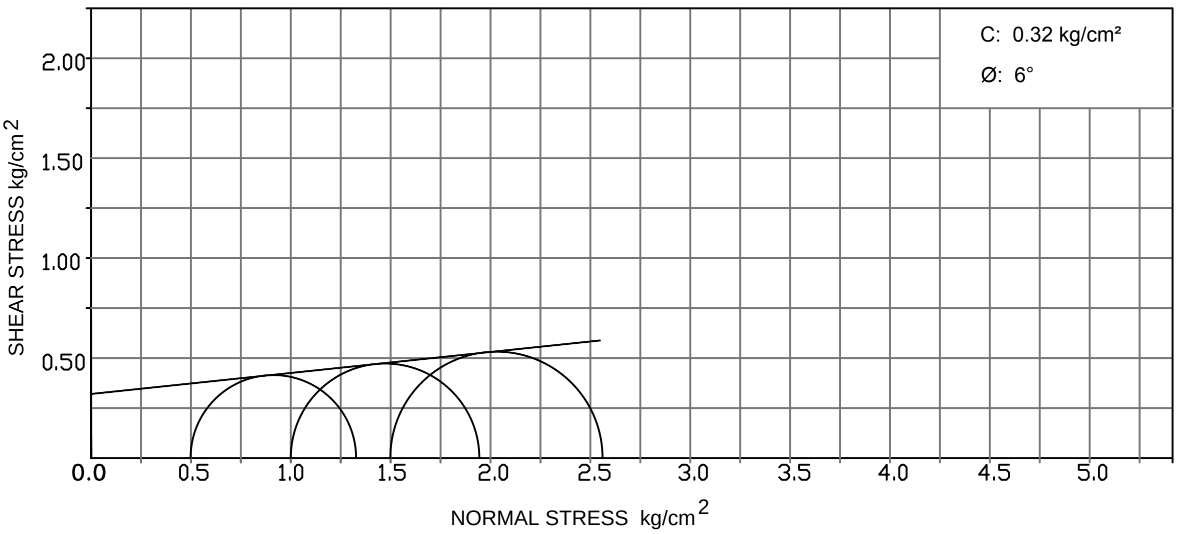
BOREHOLE NO: GT 118 DEPTH (m):3.0-3.45



Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor.

MOHR-COULOMB FAILURE ENVELOPE

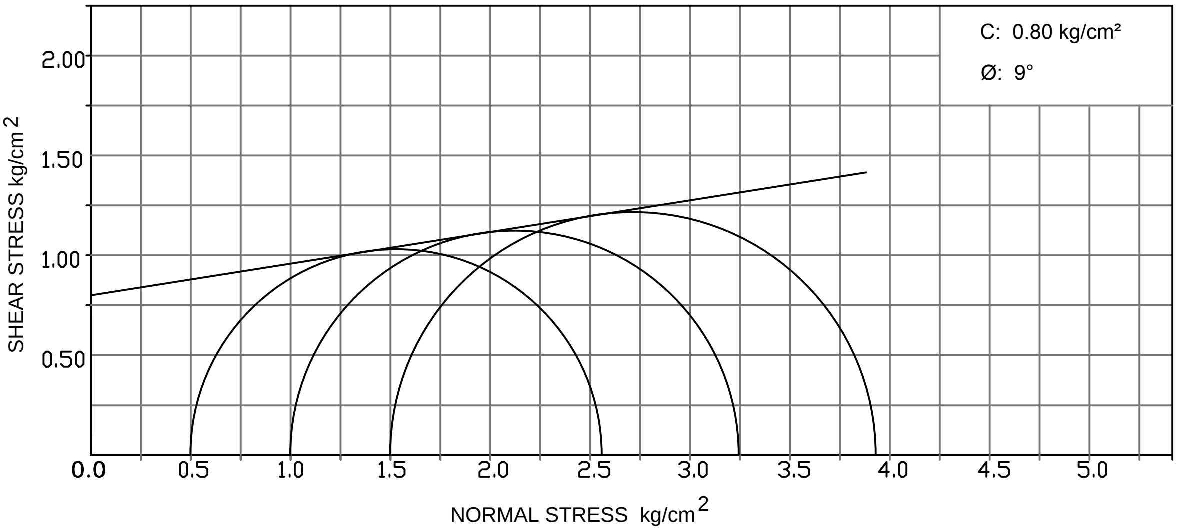
BOREHOLE NO: GT 58A DEPTH (m):3.0-3.45



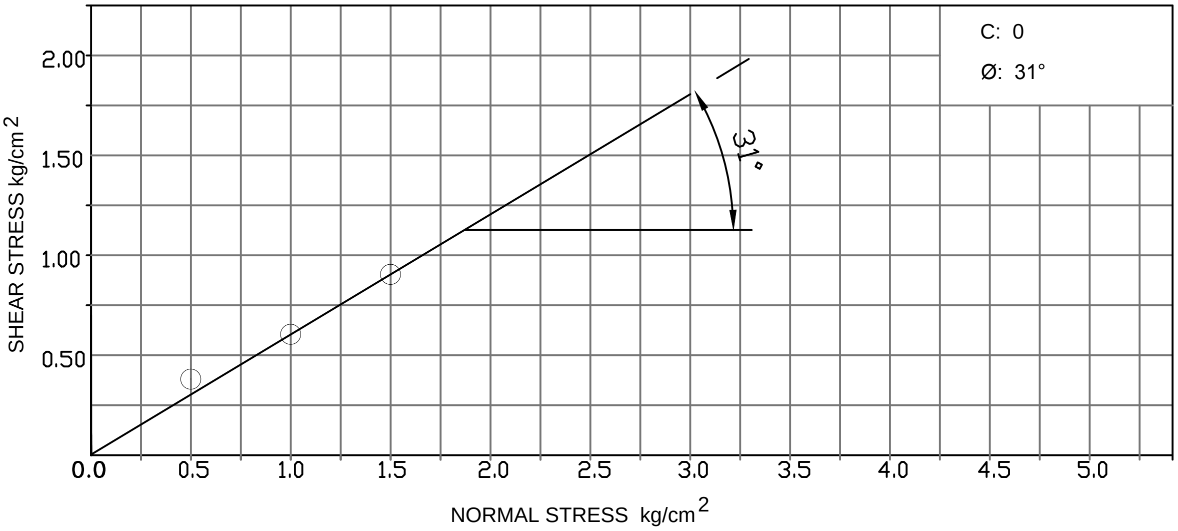
Project : Sub-soil Investigation work for Thiruvananthapuram- Kasaragod Semi-High-Speed Rail Corridor.

MOHR-COULOMB FAILURE ENVELOPE

BOREHOLE NO: GT 119A DEPTH (m):3.0-3.45



BOREHOLE NO: GT 123A DEPTH (m):13.50-13.95



KERALA RAIL DEVELOPMENT CORPORATION LTD.
5th Floor, Trans Towers, Vazhuthacaud, Thycaud P.O.
Thiruvananthapuram, Kerala - 695 014
Phone: 0471-2324330, 2326330 Fax: 0471 2325330
krdclgok@gmail.com | www.keralarail.com, www.krdcl.co.in

fb.com/OfficialKRail	krail	OfficialKRail	OfficialKRail	OfficialKRail	94468 79687